TN
1
A58
Vol. 9
M/C

REVIEW OF METAL LITERATURE

An Annotated Survey of Articles and Technical Papers Appearing in the Engineering, Scientific and Industrial Journals and Books, Here and Abroad, Received in the Library of Battelle Memorial Institute, Columbus, Ohio.

Volume 9
1952

MARJORIE R. HYSLOP
Editor

W. W. HOWELL
Technical Abstractor

Published by
AMERICAN SOCIETY FOR METALS
CLEVELAND 3, OHIO

Copyright, 1953

AMERICAN SOCIETY FOR METALS

Printed in U. S. A.

PREFACE

The A.S.M. Review of Metal Literature is a monthly feature of Metals Review, published by the American Society for Metals and distributed to its members. The present volume is a collection of the installments published in Metals Review from January through December 1952. It is the ninth volume in a series that began in 1944.

The annotations are not intended to serve as a substitute for a reading of the articles listed. They are brief abstracts designed to indicate the scope and content of the article so that the reader may determine whether it is something he wants to read in its entirety. In other words, they are indicative rather than informative abstracts.

The method of classifying the annotations into subject subdivisions is based upon the "ASM-SLA Metallurgical Literature Classification," designed by a joint committee of the American Society for Metals and the Special Libraries Association, and published by the American Society for Metals during 1950.

The table of contents lists the main headings into which the A.S.M. Review of Metal Literature is subdivided, together with secondary subdivisions indicating the scope of the main heading. The main sections are designated by capital letters, and individual annotations are identified by the appropriate capital letter preceded by a serial number. Each annotation in the text of the book is likewise followed by code symbols which refer to these main subdivisions, together with numerals which refer to subdivisions of the main classifications as listed in the table of contents. These numerals refer to the coding system used in the "ASM-SLA Metallurgical Literature Classification." For example, the symbol "C21" in parentheses at the end of an annotation indicates that the literature reference has to do with "Nonferrous Smelting and Refining" (C), and, specifically, "Smelting" (21).

The main divisions of the classification refer primarily to "processes and properties," with a final section "V" to include literature references dealing with specific materials and covering various processes and properties in a broad and general way. Materials are likewise coded by symbol at the end of each annotation. Chemical symbols of the elements are used to code metals and alloys. In addition, various materials groups are coded. For example, "EG" plus a lower-case letter refers to an "Element Group," "SG" to "Special Groups," and various combinations of capital letters indicate types of steels and cast irons. For example the symbol "C21" might be followed by the symbol "Cu," written "(C21, Cu)" and

indicating that the reference had to do with smelting of copper alloys. This coding system is explained in detail in the ASM-SLA Metallurgical Literature Classification.

An understanding of this coding system, however, is not essential to the use of this volume of the Review of Metal Literature, which is accompanied by a complete subject index starting on page 869. Since the annotations are classified primarily by processes and properties, the subject index has been prepared with the emphasis primarily on materials. Subheads and cross-references are included in sufficient detail to permit the location of articles on any specific subject related to the metal industry. Indexing is based on the content of the article and not merely on the title.

In using the book, if the primary interest is in the broad field of corrosion, or foundry practice, or heat treatment, turn immediately to the respective section as given in the table of contents. If the main interest is in aluminum alloys, or copper, or cast iron, turn to the corresponding heading in the subject index. If interest lies in specific aspects of foundry practices, or a particular type of heat treatment, these broad processes will be found broken down and subdivided in the subject index. An author index is also provided and a list of addresses of the journals and periodicals from which the literature references are taken.

Preparation of the annotations has been under the direction of W. W. Howell, technical abstractor at Battelle Memorial Institute, assisted by a staff of abstractors, and various members of the translation group at Battelle. The subject index was prepared jointly by Mr. Howell and Richard D. Hanks.

Marjorie R. Hyslop
Editor

May 1, 1953

TABLE OF CONTENTS

Section A. GENERAL METALLURGICAL 1

History (2); Education (3); Statistics and economics (4); Plant practice (5); Industrial relations (6); Health and safety (7); Secondary metals, scrap and waste disposal (8); Research organizations (9); Glossaries, definitions, trade names and directories (10).*

Section B. RAW MATERIALS AND ORE PREPARATION 29

Ore deposits and raw material reserves (10); Sampling (11); Mining (12); Crushing, grinding and sizing (13); Concentration and beneficiation (14); Roasting and calcining (15); Sintering and nodulizing (16); Briquetting (17); Fuels technology (18); Refractories technology (19); Fluxes and slags (21); Addition agents (22).

Section C. NONFERROUS EXTRACTION AND REFINING 61

Smelting (21); Distillation (22); Electrolytic processes (23); Cyanidation (24); Vacuum refining (25); Reduction by metals (26); Cementation (27); Separation of metals (28); Amalgamation (29); Carbonyl reduction (1); Hydride decomposition (2); Halide decomposition (4); Ingot casting (5).

Section D. FERROUS REDUCTION AND REFINING 76

Blast furnace (1); Openhearth (2); Bessemer (3); Electric arc (5); Electric induction (6); Duplexing, triplexing, multiplexing (7); Other processes—crucible, wrought iron, etc. (8); Ingot casting (9).

Section E. FOUNDRY 111

Melting techniques—cupola and other foundry methods (10); Sand casting (11); Permanent mold casting (12); Die casting (13); Centrifugal casting (14); Precision investment casting (15); Other methods (16); Patterns (17); Sand technology (18); Molding (19); Coremaking (21); Rigging (22); Pouring (23); Shakeout and trimming (24); Metallurgical control—solidification phenomena, fluidity, structure control (25).

* See preface for significance of numerals.

Section F. PRIMARY MECHANICAL WORKING 160

Preparation for working—stripping, heating, scalping (21); Forging (22); Rolling (23); Extrusion (24); Swaging (25); Tube-making (26); Drawing of rod (27); Wire drawing (28); Finishing operations (29); Lubricants (1).

Section G. SECONDARY MECHANICAL WORKING 185

Press work in general (1); Blanking and punching (2); Stamping (3); Drawing (4); Impact extrusion (5); Bending (6); Rubber pad forming (8); Stretch forming (9); Heading (10); Roll forming (11); Thread rolling (12); Spinning (13); Bulging (14); Shearing and trimming (15); Die sinking (16); Machining and machinability (17); Grinding (18); Honing, lapping and superfinishing (19); Cutting fluids and drawing compounds (21); Flame and arc cutting (22); Prestressing and shot peening (23).

Section H. POWDER METALLURGY 224

Powder production (10); Powder properties (11); Mixing or blending (12); Lubricants (13); Molding or compacting (14); Sintering (15); Post-sintering operations (16).

Section J. HEAT TREATMENT 236

Homogenization (21); Austenitizing (22); Annealing and malleablizing (23); Normalizing (24); Patenting (25); Quench hardening (26); Precipitation hardening (27); Case hardening (28); Tempering (29); Stress-relief (1); Heating and cooling media—induction heat, flame heat treatment, salt and lead baths, controlled atmospheres, quenching media (2).

Section K. JOINING 259

Arc welding (1); Gas welding (2); Resistance welding (3); Thermit welding (4); Forge welding (5); Other welding processes (6); Soldering (7); Brazing (8); Weldability and weld tests (9); Bonding metals to nonmetals (11); Adhesive joining (12); Mechanical fastening (13).

Section L. CLEANING, COATING AND FINISHING 316

Mechanical cleaning and polishing (10); Chemical cleaning and polishing (12); Electrochemical cleaning and polishing (13); Chemical coatings—oxide, phosphate, chromate (14); Diffusion coatings (15); Dip coatings (16); Electroplating (17); Electroforming (18); Anodizing (19); Cathodic oxide coatings (21); Cladding (22); Metal spraying (23); Weld-deposited coatings (24); Vapor-deposited coatings (25); Paint and organic coatings (26); Ceramic coatings (27).

Section M. METALLOGRAPHY, CONSTITUTION AND PRIMARY STRUCTURE 388

Microscopy (21); Diffraction methods (22); Other techniques (23); Phase diagrams (24); Nuclear and atomic structures (25); Crystal structure (26); Microstructure (27); Macrostructure (28).

Section N. TRANSFORMATIONS AND RESULTING STRUCTURES 433

Diffusion (1); Nucleation (2); Grain growth (3); Recovery (4); Recrystallization (5); Allotropic transformations (6); Precipitation (7); Austenite decomposition (8); Other eutectoid reactions (9); Superlattice formation (10); Other reactions in the solid state (11); Liquid-solid reactions (12); Liquid phase reactions (14); Vapor-solid reactions (15); Vapor-liquid reactions (16).

Section P. PHYSICAL PROPERTIES AND TEST METHODS 465

Mass (10); Thermal (11); Thermodynamic (12); Chemical (13); Electrical (15); Magnetic (16); Optical (17).

Section Q. MECHANICAL PROPERTIES AND TESTS; DEFORMATION 522

Elastic properties (21); Anelasticity (22); Plastic properties (23); Plastic deformation (24); Stresses (25); Fracture (26); Tension (27); Compression (28); Hardness (29); Torsion (1); Shear (2); Creep (3); Stress-rupture (4); Bend (5); Impact (6); Fatigue (7); Damping (8); Wear and friction (9).

Section R. CORROSION 627

Mechanism of corrosion—galvanic, concentration cell, erosion-corrosion, stress-corrosion, corrosion fatigue, etc. (1); Corrosive effects—general dissolution, intergranular, pitting, cavitation, scaling and tarnishing, etc. (2); Atmospheric corrosion (3); Waters (4); Aqueous solutions (5); Concentrated inorganic chemicals (6); Organic chemicals (7); Soils (8); Gases (9); Preventive measures (10); Tests (11).

Section S. INSPECTION AND CONTROL 676

Sorting and identification (10); Composition analysis (11); Statistical control (12); Flaw detection (13); Size measurement (14); Surface roughness (15); Temperature measurement and control (16); Process control (18); Radiation detection and radioactive tracers (19); Miscellaneous service failures (21); Standards and specifications (22).

Section T. APPLICATIONS OF METALS IN EQUIPMENT 720

Automotive (21); Marine (22); Railroads (23); Aircraft (24); Mining and oil field equipment (28); Chemical equipment (29); Electrical and electronic equipment (1); Armor and ordnance (2); Agricultural equipment (3); Civil engineering equipment (4); Metallurgical equipment (5); Small tools, cutlery and hardware (6); Machine parts (7); Instruments (8); Fine arts (9); Miscellaneous consumer products (10).

Section V. MATERIALS 759

This section is reserved for literature references dealing with specific materials, and covering various processes and properties in a broad and general way.

ADDRESSES OF PUBLICATIONS 777

AUTHOR INDEX 797

SUBJECT INDEX 869

SECTION A

GENERAL METALLURGICAL

1-A. Well Heeled. *Business Week,* Nov. 17, 1951, p. 82, 84.

Activities and financial status of American Society for Metals. Outlines publications, Metal Show activities, income and expense breakdown, and a new awards program for teachers of metallurgy. (A9)

2-A. Lead Supply Fading Away. *Business Week,* Nov. 17, 1951, p. 124, 126, 129.

The lead supply problem and the various factors affecting it. (A4, Pb)

3-A. Waste Treatment in the Modern Steel Mill. J. E. Cooper, *Iron and Steel Engineer,* v. 28, Nov. 1951, p. 81-84.

Various functions to be performed in the steel mill. (A8)

4-A. Alan Wood Steel Installs Mill Scale Recovery Plant. R. F. Coltart. *Iron and Steel Engineer,* v. 28, Nov. 1951, p. 128.

A waste-treatment plant that features a mill scale recovery technique. (A8)

5-A. Research Into the Properties of Tin. *Machinery Lloyd,* (Overseas Edition), v. 23, Oct. 27, 1951, p. 91, 93-94.

Work at Tin Research Institute in England. (A9, Sn)

6-A. Some Industrial Treatment Plants in Connecticut. Willis J. Snow. *Sewage and Industrial Wastes,* v. 23, Nov. 1951, p. 1408-1418.

A review of several of the more successful industrial waste treatment plants in Connecticut. Includes pickle liquor from steel-wire mills, plating-room wastes, metal wastes containing cyanide, and paperboard-mill white water. (A8)

7-A. Design and Operation of a Metal Wastes Treatment Plant. C. M. Gard, C. A. Snavely, and D. J. Lemon. *Sewage and Industrial Wastes,* v. 23, Nov. 1951, p. 1429-1438.

Design and construction of plant of Ranco, Inc., Delaware, Ohio. Cleaning and plating operations involved include oil and dirt removal from stampings by washing with an alkaline cleaner, cleaning and acid dips in preparation for plating, zinc and copper plating, and Iridite treatment (chromating) of certain parts. (A8, L12, L14)

8-A. The Basic Metal. Paul Cohen. *Technology Review,* v. 54, Nov. 1951, p. 25-28, 42, 44.

Trends in the steel industry. Outlook for future output. Some production data. (A4, ST)

9-A. Catalytic Combustion of Atmospheric Contaminants in Effluent From Wire Enameling Ovens. Alexander E. Goss. *Wire and Wire Products,* v. 26, Nov. 1951, p. 1051-1055, 1089-1090.

Investigation indicates that considerable reduction of atmospheric contaminants and combustible materials is possible. (A8, L26)

10-A. Conservation of Strategic Metals in Germany. Karl P. Harten. *Metal Progress,* v. 60, Nov. 1951, p. 58-63.

Cooperation of consumers; search for dependable short-time tests; conservation in processing and designing; conservation in steel production and in nonferrous metals; substitution of alloys; desirability of cooperation and research. (A general)

11-A. A Sampling From World Metallurgical Congress Visitations. *Metal Progress,* v. 60, Nov. 1951, p. 77-87.

A summary of reports. Inspections and control in process; manufacture of special bronze; welding of auto bodies and soldering of radiators; pyrometers, furnaces and controls; wrought and cast magnesium; machinability in relation to chips; and lubricants and thin-walled bearings. (A5)

12-A. Manganese: New Supply in Steel Slag. T. Metaxas. *Iron Age,* v.

168, Dec. 6, 1951, p. 111-112.

Four methods are being worked out for the recovery of Mn. The process reported to be nearest commercial application is that of the Bureau of Mines station in Pittsburgh. A miniature blast furnace is producing from slag, a high-phosphorus spiegeleisen for conversion to a product similar to commercial grade Mn. (A8, B21, Mn)

13-A. Toxic Metals Cause New Industrial Disease Problems. W. Schweisheimer. *Iron Age,* v. 168, Dec. 6, 1951, p. 159-161.

Examples of the kinds of disease problems caused by specific metals. 18 ref. (A7)

14-A. The Growth of Western Steel. Walther Mathesius. *Western Machinery and Steel World,* v. 42, Nov. 1951, p. 90-93, 108.

An address before Los Angeles Chapter A.S.M. History of western steel industry. (A4, A2, ST)

15-A. Aluminum: New Kaiser Plant Opens. *Iron Age,* v. 168, Dec. 13, 1951, p. 88-89.

Kaiser Aluminum & Chemical Corp.'s Chalmette plant at New Orleans, La. Fuel requirements and materials are discusssed. (A5, Al)

16-A. Production of Copper Sulphate From Mine-Water Precipitate. A. G. Lyle. *Canadian Mining and Metallurgical Bulletin,* v. 44, Nov. 1951, p. 715-716; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 54, 1951, p. 445-446.

Plant and procedure by which $CuSO_4$ is now being made, and by means of which an appreciable saving is being effected. The $CuSO_4$ is used in the mill for recovery of sphalerite by flotation. (A8, B14, Cu)

17-A. Conservation of Materials. J. R. Widdowson. *Iron and Steel,* v. 24, Nov. 1951, p. 497-499.

The scarcity of alloy steel, stainless steel and toolsteel as well as H_2SO_4 for pickling, and of fuels. Suggestions on conservation practices. (A4, AY, SS, TS)

18-A (Book) **Industrial Wastes; Their Conservation and Utilization.** Ed. 1. Charles H. Lipsett. 317 pages. 1951. Atlas Publishing Co., 425 West 25th St., New York 1, N. Y.

Purpose of the book is to give the average reader an acquaintance with the principal scrap and waste materials, their sources of supply, their production and processing. The various types of wastes are discussed in turn. Includes several sections on metallic wastes. (A8)

19-A. (Book) **Punched Cards; Their Applications to Science and Industry.** Robert S Casey and James W. Perry, editors. 506 pages. 1951, Reinhold Publishing Corp. 330 W. 42nd St., New York 18, N. Y. $10.00.

Introduction by the editors; three articles on punched-card applications; ten articles on miscellaneous considerations, including mathematical calculations involved in design of punched-card systems; an article on the possibility of applying mechanized methods to scientific and technical literature; and a bibliography of 276 references. Primary purpose is to meet the needs of the individual scientist or engineer. Hand-sorted edge-punched cards are discussed in greater detail than machine-sorted cards. (A3, U8)

20-A. (Book) **Alcoa, an American Enterprise.** Charles C. Carr. 292 pages. Rinehart & Co., Inc., New York City. $3.50.

A highly readable and restrained account of the American aluminum industry by a man who was director of public relations for Alcoa for some 15 years. As befits a volume for the general reader, much is said about the unusual personalities involved in the growth of the corporation, but the book also is a well-balanced statement of the development of ore resources, power plants, fabrication mills, products, markets, and hasty expansion under wartime conditions. Fascinating chapters describe the almost interminable law suits brought by the U. S. Government under the antitrust act. E.E.T. (A2, A4, A5, Al)

21-A. (Book) **Herbert H. Dow; Pioneer in Creative Chemistry.** Murray Campbell and Harrison Hatton. 168 pages. 1951. Appleton-Century-Crofts, Inc., New York City.

One of the best of several recent "popular" books about personages important to American industrial progress in the first half of the 1950's, and published by or for the firms which remain as their monuments. Henry Ford and Herbert H. Dow were kindred spirits in that each had creative minds and sufficient drive to convert new ideas into commercial operations. Each started on a shoestring and each was responsible for a near-revolution in American life—respectively, the Model T and aspirin. In all seriousness, metallurgists will enjoy this book about a great American. His conquest of magnesium chloride was only one of his major accomplishments. E.E.T. (A2, Mg)

22-A. (Book) **Annual Report of Council.** 131 pages. 1950. British Iron & Steel Research Assn., 11 Park Lane, London W. 1, England.

Includes summary of work of the various divisions in metallurgy and metalworking. (A9)

23-A. (Book) **The Wire Industry Encyclopaedic Handbook.** 400 pages. 1951. Wire Industry, Ltd., 33 Furnival St., London, England.

Useful directory and dictionary of nearly all the products covered by the English wire industry includes an alphabetical directory of the names and addresses of all the firms mentioned in the handbook. A section deals with wire-mill supplies followed by a survey of machinery, wire supplies and wire parts, springs and services. Diamond and sintered carbide dies, and notes on the maintenance of drawing dies as well as on the inspection and maintenance of diamond wire drawing dies. (A10, F28)

24-A. 1951 Vessel Shipments of L. S. Iron Ore Totaled 89,092,012. *Skillings Mining Review,* v. 40, Dec. 22, 1951, p. 1-2.

Includes graph indicating shipments from Lake Superior year by year since 1885. Table shows shipments from different upper-lake ports. (A4, Fe)

25-A. Management of Industrial Research. James C. Zeder. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 1-6.

Importance of research in industry today. Functions of a research director. (A9)

26-A. Problems of Dust Removal and of Ventilation in the Foundry Industry. (In French.) Wolf Mulharad. *Fonderie,* Nov. 1951, p. 2671-2684.

Nature of dusts, sources of emission of vapors and dusts, their neutralization, and types of dust removers now in use. (A7, E general)

27-A. World Supply of Non-Ferrous Metals. R. Lewis Stubbs. *Engineering,* v. 172, Nov. 30, 1951, p. 702-703; Dec. 7, 1951, p. 732-734.

Data on production and consumption of all the major nonferrous metals; namely, Cu, Zn, Sn, Al, Mg. Allowance is made for the role of scrap, the amount of which continues to rise in increasing proportion with the rise in the consumption of the virgin metal. Data are tabulated.
(A4, Cu, Zn, Sn, Al, Mg)

28-A. The Steel Supply Picture for 1952. R. F. Sentner. *Finish,* v. 9, Jan. 1952, p. 26, 83-84.

Briefly discussed. (A4, ST)

29-A. Technical Trends; Ingenuity Must Overcome Shortages in 1952. D. I. Brown. *Iron Age,* v. 169, Jan. 3, 1952, p. 253-259.

A summary covering a selected group of developments of 1951, in the metalworking industry. 27 ref. (A general)

30-A. Defense Controls Guide. *Iron Age,* v. 169, Jan. 3, 1952, p. 327-334.

Digests principal material control orders affecting the metalworking industry, lists CMP regulations and NPA forms, revised to Dec. 15, 1951. Also a list of controls officials with their room and telephone numbers. Four pages list principal metal products bought by the armed forces and locations of the buying offices. (A4)

31-A. *The Iron Age* **1952 Metal Industry Facts.** *Iron Age,* v. 169, Jan. 3, 1952, p. 381-476.

Includes sections on: steel industry, nonferrous metals, raw materials, metal products, casting, forging, machinery, market data, labor and safety. Extensive tabular data. (A4)

32-A. National Trade Associations and Technical Societies. *Iron Age,* v. 169, Jan. 3, 1952, p. 478, 480, 482, 484-486, 488, 490.

A list of some 200 professional and technical societies and trade associations in metalworking and metal production. (A10)

33-A. Metalworking Meetings Scheduled for 1952. *Iron Age,* v. 169, Jan. 3, 1952, p. 512-514, 516.

Technical meetings, conventions and expositions on various phases of metalworking and metal production. (A10)

34-A. Secondary Heavy Metals. E. H. Jones. *Metal Industry,* v. 79, Nov. 30, 1951, p. 457-459.

Primary and secondary reserves of metals available for existing needs. Technical improvements in scrap recovery. (A8, B10)

35-A. Secondary Aluminum and Magnesium. W. C. Devereux. *Metal Industry,* v. 79, Dec. 7, 1951, p. 483-485.

Growth of the secondary Al industry from comparative obscurity to its present position. Developments now in use and those which appear to have a promising future. Difficulties as yet unsurmounted. (A8, Al, Mg)

36-A. Metallurgy at the Bureau of Standards in the Past 50 years. John G. Thompson. *Metal Progress,* v. 60, Dec. 1951, p. 51-57.

The original organization consisted of six divisions concerned with the establishment and maintenance of standards in the fields of electricity, weights and measures, heat and power, optics, chemistry and mechanics. Accomplishments in recent years. (A9)

37-A. Spectacular Growth In Magnesium Consumption; Pre-Korea Plans To Boost Output Accelerated. J. D. Hanawalt. *Metals,* v. 22, Dec. 1951, p. 9, 12, 18.

Economic status and present trends. (A4, Mg)

38-A. Increasing the Supply of Lead and Zinc. Otto Herres, II. *Mines Magazine,* v. 91, Dec. 1951, p. 31-32.

Present shortages and recommendations for governmental actions to help alleviate them. (A4, Pb, Zn)

39-A. The Ozonation of Cyanide Wastes. Richard G. Tyler, William Maske, Willard Matthews, and M. J. Westin. *Proceedings of the Sixth Industrial Waste Conference,* Nov. 1951, p. 64-69.

Efficiency of the process is improved by holding the pH at the beginning of the treatment to 11.0-12.0 so that oxidation to cyanate becomes complete before pH drops below 8.0. Plastics, wood, Al, Cu, stainless steel, and black iron protected by asphaltic enamel or paint were shown to withstand oxidation by ozone. (A8, R2, L26, Al, Cu, SS, CI)

40-A. Treatment of Chromium Wastes by Ion Exchange. Richard G. Tyler, William Maske, and Milton J. Westin. *Proceedings of the Sixth Industrial Waste Conference,* Nov. 1951, p. 135-140.

An investigation of the process. Effect of this treatment on controlling stream pollution. (A8, Cr)

41-A. Removal of Cations From Chromic Acid Solutions. D. M. Stromquist and A. C. Reents, *Proceedings of the Sixth Industrial Waste Conference,* Nov. 1951, p. 181-189.

Removal of cations in order that chromic acid bath life may be prolonged and that costly disposal treatment may be avoided. Data are graphed. (A8, L17, Cr)

42-A. Handling of Metal Bearing Wastes at Erie, Pennsylvania. John W. Townsend. *Proceedings of the Sixth Industrial Waste Conference,* Nov. 1951, p. 292-303.

Presents basic design data and a description of two waste treatment plants now under construction at the Erie Works of General Electric Co. as well as the problems involved in the collecting of the various spent acids and metal-bearing and cyanide rinse waters, and conveying the same points for subsequent neutralization and treatment prior to discharging into Lake Erie. (A8)

43-A. Cyanide Disposal After Plating Cycle. C. F. Hauri. *Proceedings of the Sixth Industrial Waste Conference,* Nov. 1951, p. 320-323.

As experienced by the Delco-Remy Division of G. M. Corp., Anderson, Ind. (A8, L17)

44-A. Purification of Wastes in a Metalworking Plant by Lagooning. Charles R. Griffith. *Proceedings of the Sixth Industrial Waste Conference,* Nov. 1951, p. 421-433.

Lagooning of metalworking wastes is, in one case at least, a successful method to produce at a low cost an effluent that meets the requirements of most states. Graphs. (A8)

45-A. How To Do Business Under Government Controls. *Steel,* v. 130, Jan. 7, 1952, p. 127-137, 518, 520, 522, 525, 526.

Digests of production controls affecting the metalworking industry. (A4)

46-A. 1952 Metalworking Facts and Figures. *Steel,* v. 130, Jan. 7, 1952, p. 167-214.

Statistics on raw materials all the way through the end products of the metal consuming industries. Includes such related subjects as labor, prices, and earnings. (A4)

47-A. Bibliography on Titanium. Jean Richards Carpenter and Gwendolyn Werth Luttrell. *U. S. Geological Survey,* Circular 87, Jan. 1951, 19 pages. (Z5524.T6 C22b)

Includes the more significant publications on Ti issued to Jan. 1, 1950. One or two important papers issued since that date have been added. The papers are listed by issuing organizations—Federal and State Bureaus—and by various groups of publications—books and scientific and industrial journals. (A10, Ti)

48-A. The Aluminum Situation. J. H. DeKlyn. *Wire and Wire Products,* v. 26, Dec. 1951, p. 1137-1139, 1191-1193.

Economic analysis. Statistics and predictions. (A4, Al)

49-A. Nonferrous Metals in the 6-Year Plan. (In Polish.) Boleslaw Chudzio. *Hutnik,* v. 17, Nov.-Dec. 1950 p. 406-410.

Developments planned for the next six years in Poland. Includes plans for development of native Sn-Pb, Cu, and Ni ores; beneficiation and smelting problems; refining and fabrication problems; rolling; and training programs. (A4, B general, C general, F23, EG-a)

50-A. Metals Industry. I. E. Campbell. *Chemical and Engineering News,* v. 30. Jan. 7, 1952, p. 34-36.

Reviews economic and technical developments of 1951 under the headings: Ti, Zr, Mo, V, Cr, Al, Mg, Cu, Sn, Ni, Co, iron and steel, and ceramic-metal combinations. (A4, A general)

51-A. Markets—Trends and Prices. *Engineering and Mining Journal,* v. 153, Jan. 1952, p. 68-69.

Tabulated data and brief discussions on prices and output for major

metals, miscellaneous metals, ores, and minerals. (A4)

52-A. Chemical and Metalllurgical. *General Electric Review,* v. 55, Jan. 1952, p. 50-53.

An illustrated review of 1951 General Electric developments in above fields. (A general)

53-A. The Zinc Consumer Industry, 1949-51. B. Walters. *Metallurgia,* v. 44, Dec. 1951, p. 295-298.

Emphasizes making the best use of the metal available, and thus releasing further supplies for possible future uses. 14 ref. (A4, Zn)

54-A. (Book) **Accident Prevention Manual for Industrial Operations.** Ed. 2, unpaged. 1951. National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill.

A comprehensive source of guides to industrial safety. Chapters take up specific groups of equipment or types of hazards. (A7)

55-A. (Book) **Proceedings of the Sixth Industrial Waste Conference.** 524 pages. Nov. 1951. Purdue University, Lafayette, Ind. (Engineering Extension Dept., Series 76.)

Forty-nine papers by various authors on the treatment of waste material. Included are treatment of cyanide waste, Cr waste disposal by ion exchange, and handling of metal-bearing wastes. Selected individual papers are abstracted separately. (A8)

56-A. (Pamphlet) **Thirtieth Annual Report for the Year Ending June 30th, 1951.** Oct. 1951, 24 pages. British Cast Iron Research Association, Alvechurch, Birmingham, England.

A brief survey of research work carried on by the organization. (A9, CI)

57-A. (Pamphlet) **Tube Laboratory Manual.** 1951, 98 pages. Massachusetts Institute of Technology, Research Laboratory of Electronics, Cambridge, Mass.

A manual of procedures used in tube development at M.I.T. Degreasing and cleaning of metal and other tube parts, electroplating Ni, Cu, Ag, Au, Pt, and stainless steel, hydrogen brazing and heat treatment, and various tube laboratory procedures. General information on materials used is given in tabular form. (A9)

58-A Prospects. *Modern Packaging,* v. 25, Jan. 1952, p. 75-83, 175-176.

Economic outlook for the raw materials of packaging. Includes paper, cellophane, metals, lumber, rubber, adhesives, waxes, and plastics. (A5)

59-A. Developments in the Iron and Steel Industry During 1951. I. E. Madsen. *Iron and Steel Engineer,* v. 29, Jan. 1952, p. 103-138.

(A general, ST)

60-A. Industrial Wastes. Harold R. Murdock. *Industrial and Engineering Chemistry,* v. 44, Jan. 1952, p. 105A-106A, 108A.

Deleterious effects of Cu and Cr wastes to biological sewage-disposal methods. Considers especially problems encountered along the Naugatuck River in Connecticut. (A8, Cu, Cr)

61-A. Atmospheric Pollution. Louis C. McCabe. *Industrial and Engineering Chemistry,* v. 44, Jan. 1952, p. 113A-114A, 116A.

Efforts being made by Los Angeles nonferrous industries to reduce lead emissions in order to protect employees and improve air hygiene. Refers especially to Pb reclamation and Pb alloy foundries. Recovery equipment is diagrammed; electron micrographs show structure of fume particles. (A7, Pb)

62-A. Alternate Steels to Conserve Critical Alloying Elements. Alexander H. d'Arcambal. *Machinery* (American), v. 58, Jan. 1952, p. 189-190. (A condensation).

A survey, with emphasis on effects of boron. (A general, AY)

63-A. Secrecy in Nuclear Engineering. J. G. Beckerley. *Nucleonics,* v. 10, Jan. 1952, p. 36-38.

Questions whether we can effectively compete in the world atomic race unless we let down the barriers of secrecy. This problem is considered specifically as applied to raw materials, ore concentration and beneficiation, feed materials, production of fissionable materials, and production of atomic weapons. (A6, B general)

64-A. The Research Laboratories of Associated Electrical Industries Ltd. Arthur Fleming, B. G. Churcher, and L. J. Davies. *Proceedings of the Royal Society,* ser. A, v. 210, Dec. 20, 1951, p. 145-172.

British laboratories, which are engaged not only in practical electrical and electronic problems, but also in such fields as mechanical engineering, metallurgy and metalworking, physics, chemistry, etc. (A9)

65-A. Incorporation of Dust Control in Foundry Planning. J. Hunter. *British Cast Iron Research Association Journal of Research and Development,* v. 4, Dec. 1951, p. 152-156; disc., p. 156-161.

The difficulties of controlling heavy concentrations of dust and fume in the jobbing foundry. In

larger jobbing foundries, dust and fumes can be alleviated by introducing one common knock-out point and by installing a simple sand reconditioning plant incorporating dust control. The question of slag and sand disposal, and the fettling shop and the core shop. (A7, E general)

66-A. 1951 Exceeds All Previous Years in Iron and Steel Production. Walter S. Tower. *Blast Furnace and Steel Plant,* v. 40, Jan. 1952, p. 47-48.
Briefly surveyed. (A4, Fe, ST)

67-A. Consumption of Scrap at a Record in 1951. Edwin C. Barringer. *Blast Furnace and Steel Plant,* v. 40, Jan. 1952, p. 49-50.
Statistical survey dealing only with ferrous scrap. (A4, Fe, ST)

68-A. The British Iron and Steel Industry in 1951. *Engineer,* v. 193, Jan. 4, 1952, p. 15-18; Jan. 11, 1952, p. 66-67. (A4, ST)

69-A. Metallurgical Research and Development in 1951. *Engineer,* v. 192, Jan. 18, 1952, p. 91-93.
Includes data on steels and alloys for gas turbines, low-temperature properties of metals, advances in the metallurgy of rarer metals, corrosion studies and metal resources and economics. (A general)

70-A. Review of Materials Engineering Developments in 1951. T. C. Du Mond. *Materials & Methods,* v. 35, Jan. 1952, p. 103-114.
A round-up of the major developments in: iron and steels, nonferrous metals, nonmetallic materials, fabricated parts and forms, finishes and coatings, heat treating, cleaning and finishing, and welding and joining. (A general)

71-A. Metallurgical Treatment of Swarf. E. R. Thews. *Metal Industry,* v. 79, Dec. 21, 1951, p. 521-524; Dec. 28, 1951, p. 535-538; v. 80, Jan. 4, 1952, p. 7-8, 10.
Methods of handling and storing, preliminary treatment, and subsequent metallurgical treatment. (A8)

72-A. Method of Recovery From Flue Dusts: Germanium and Gallium. F. M. Lever. *Metal Industry,* v. 80, Jan. 4, 1952, p. 3-4.
Includes flow sheet of the process used for the recovery of Ge and Ga from producer gas-flue dusts. (A8, Ge, Ga)

73-A. Pure and Applied Science in American Metallurgy. Cyril Stanley Smith. *Metal Progress,* v. 61, Jan. 1952, p. 51-54.
Stresses the benefits to be derived by the metallurgist by knowledge in other fields: i.e., physics, chemistry, etc. (A3)

74-A. Aluminum for Defense and Prosperity. Dewey Anderson. *Modern Metals,* v. 7, Jan. 1952, 43-46; disc., p. 46.
This country has about reached its limit in the expansion of economic aluminum production, so the best way to foster competition and growth is to open the door to greatly increased quantities of Canadian aluminum—in other words, encourage Alcan to complete its vast Kitimat smelter as soon as possible. Includes editor's commentary. (A4, Al)

75-A. More Scrap, More Tin; Detinning Produces Both. *Steel,* v. 130, Jan. 28, 1952, p. 70-72, 74.
Process at Weirton Steel to conserve Sn and recover scrap which formerly could not be used in open-hearth operations because of the presence of tin. (A8, Sn, ST)

76-A. The World Lead Situation. F. L. Hallam. *Western Miner,* v. 25, Jan. 1952, p. 35-38.
(A4, Pb)

77-A. Metal Economics. II. Scrap Reclamation, Secondary Metals, and Substitute Metals. *Journal of the Institute of Metals,* v. 80, Jan. 1952, p. 240-252; disc., p. 252-254.
"The Scope for Conservation of Metals, Ferrous and Non-Ferrous," C. A. Bristow, A. J. Sidery and H. Sutton; "Economy by Standardization of Alloys and of the Method of Reclamation of Scrap Metals," C. Dinsdale; "The Influence of Specifications on Productivity and the Economic Utilization of Ferrous and Non-Ferrous Metals," F. Hudson; "Secondary Heavy Metals," E. H. Jones; "Secondary Aluminium and Magnesium," W. C. Devereux. (A8)

78-A. Modern Innovations and Progress in the Iron and Steel Industry. (In Spanish.) Georg Bulle. *Instituto del Hierro y del Acero,* v. 4, Jan.-Mar. 1951, p. 1-10.
Prior preparation of raw materials, production of cast iron and pig iron, transformations of iron and steel, improvement of quality, and scientific organization of working operations. Photographs and table. (A general, Fe, ST)

79-A. Industrial Research in the United States. (In Spanish.) Fred A. Morral. *Instituto del Hierro y del Acero,* v. 4, Jan.-Mar. 1951, p. 11-16.
Brief review of the amount and kinds of private and government industrial research presently being carried on in the U. S. Data are tabulated. (A9)

80-A. Raising Our Capacity to Produce. Metals Loosen The Logjam. *Engineering News-Record,* v. 148, Feb.

14, 1952, p. 77-79.
General status of the metal industry. (A4)

81-A. Safety Precautions for Special Work. H. Allen. *Foundry Trade Journal,* v. 92, Jan. 24, 1952, p. 93-94.
As applied in foundry practice. (A7, E general)

82-A. Copper-Base Non-Ferrous Ingots. W. G. Mochrie. *Foundry Trade Journal,* v. 92, Jan. 31, 1952, p. 121-124.
Classification of various types. Chart shows possibilities of mistaken identity in normal sorting techniques for Cu-base alloys, applied in connection with scrap recovery. (A8, S10, Cu)

83-A. An Economic Study of Fuels in Manufacturing. Walter H. Voskuil. *Illinois State Geological Survey,* Report of Investigations 157, 1951, 28 pages.
Data on the amount and kind of each fuel used per employee, by industries or industry groups; the role of electric power; the quantities used by workers; changes since 1939; comparative fuel costs; and the competitive trend among fuels. Emphasizes fuels and power in the iron and steel industries. (A4, B18, Fe, ST)

84-A. Recovery of Chromic Acid From Plating Operations. F. R. Keller and R. E. Shaw. *Plating,* v. 39, Feb. 1952, p. 152-154.
The recovery system at the Standard Steel Spring Co., Newton Falls, Ohio. Diagrams. (A8, L17)

85-A. Waste Pickle Liquor Treatment and Disposal. I. Problem of Waste Pickling Liquor Disposal. Thomas F. Reed. **II. Waste Pickle Liquor Treatment by Armco Steel Corporation at Butler, Pa.** Grant A. Pettit. **III. Waste Pickle Liquor Disposal by Walker of Conshohocken.** W. A. Cubberley and C. J. Lewis. **IV. Central Treatment Plant for Waste Pickle Liquor.** John H. Harper. *Sewage and Industrial Wastes,* v. 24, Jan. 1952, p. 66-82.
(A8, L12)

86-A. Interrelationship of Air Pollution and Water Pollution. Louis C. McCabe. **Discussion.** M. Allen Pond, and E. Neil Helmers. *Sewage and Industrial Wastes,* v. 24, 1952, p. 83-91.
Emphasis is on the mineral industry. (A7)

87-A. (Book) **Capital Development in Steel; A Study of the United Steel Companies Ltd.** P. W. S. Andrews and Elizabeth Brunner. 374 pages. 1951. Basil Blackwell, Oxford, England.
Detailed information on production techniques and processes, industrial environment and development, managerial reorganization and financial reconstruction, and capital development from the thirties through 1950. The theory of investment decisions is stressed. (A4, ST)

88-A. (Book) **Man and the Chemical Elements** (From Stone-Age Hearth to the Cyclotron). J. Newton Friend. 354 pages. 1951. Charles Griffin & Co. Ltd., 42 Drury Lane, London, W.C. 2, England. 27S, 6d.
A book to browse in. Especially is it a fascinating collection of citations in literature to the metals known in ancient and medieval times. A clear account is given of the discovery of each of the elements which have been isolated since the age of alchemy. Outlines of the development of knowledge and the commercial uses of each element are written as only they could be by a man of great breadth of chemical and physico-chemical information. To compress it all in 354 pages the treatment must be sketchy, and the information about the score of metallic elements widely used in civilized countries lacks scope and timeliness—but after all, one consults this book not for today's developments but to find out what our ancestors thought was important enough to record. E.E.T. (A2)

89-A. (Book) **Manufacturing Equipment and Processes.** Charles W. Lytle and Arthur F. Gould. 759 pages. 1951. International Textbook Co., Scranton, Pa.
As applied to the metallurgical industries. Chapter references. (A general)

90-A. (Book) **Productivity Report on Wrought Nonferrous Metals Industry by the British Nonferrous Metals Productivity Team.** Anglo-American Council on Productivity, 2 Park Ave., New York. 75c.
A summary of recommendations for British manufacturers based on visits to American brass mills by a "productivity" team. (A4, F general, Cu)

91-A. (Book) **A Technical Survey of the Abbey.** Margam, Trostre and Newport Plants of the Steel Co. of Wales, Ltd. Numerous authors. 262 pages, 1951. Industrial Newspapers, Ltd., 49 Wellington St., London W.C. 2, England.
A complete account of the design and construction of new sheet and tin-plate mills and associated blast furnaces, openhearths and auxiliaries at Port Talbot, Wales. The plans represented far more than the modernization of an existing plant; they represented no less than a revolution in the steel industry of South Wales. Various chapters, written by members of the company's technical staff, the consulting engineers, the contractors and equipment manufac-

turers, describe and illustrate all phases of this project with total annual capacity of 2,000,000 tons—big in anybody's economy. (A5, ST)

92-A. (Book) **3100 Needed Inventions.** Raymond F. Yates. 336 pages. 1951. Wilfred Funk, Inc., New York.

Stresses the need for inventors with analytical minds able to improve the ordinary equipment we come in contact with in our everyday lives. Includes metallurgical problems. (A general)

93-A. (Book) **Waste Trade Directory of Dealers and Consumers in the United States and Canada.** 990 pages. 1951. Atlas Publishing Co., 425 W. 25th St., New York 1, N. Y.

Lists dealers in textile equipment, rubber machinery, scrap metals, auto wreckers, secondhand bags and bagging, paper mills, etc. Arranged by states and cities under broad headings. (A8)

94-A. (Book) **Metallurgische Verarbeitung von Altmetallen und Rueckstaenden. (Band II.)** (Metallurgical Treatment of Scrap Metals and Wastes. Vol. II.) Edmund R. Thews. 290 pages. Carl Hanser Verlag, Munich 27, Germany. 31.50 DM.

Deals with Cu and Cu-base alloys. Sorting of the metals and general treatment procedures. Methods of handling Cu scrap, brasses and bronzes. Gas content and porosity; deoxidation; use of various types of melting units; screening of chips; stripping of lead-covered cable; the occupational diseases of lead poisoning and zinc fever. (A8, Cu)

95-A. Metals in Review. M. A. Kriz. *Engineering nad Mining Journal,* v. 153, Feb. 1952, p. 74-102.

A survey of economic developments and trends of the past year: "Gold," M. A. Kriz; "Silver," Dickson H. Leavens; "Copper," H. H. Wanders; "Lead," Robert L. Zeigfeld; "Zinc," Charles R. Ince; "Tin," H. H. Wanders; "Aluminum," O. C. Schmedeman; "Magnesium," J. D. Hanawalt; "Uranium," Alvin W. Knoerr; "Minor Metals," Charles White Merrill; "Antimony," Abbott Renick; "Arsenic," Abbott Renick; "Beryllium," Stanley Needleman; "Bismuth," Abbott Renick; "Cadmium," Robert L. Mentch; "Mercury," Helena M. Meyer; "Platinum-Group Metals," James E. Bell; "Titanium," Frank J. Cservenyak; "Ferro-Alloy Metals," Robert H. Ridgway; "Chromite," Norwood B. Melcher and John Hozik; "Cobalt," Hubert W. Davis; "Nickel," Hubert W. Davis; "Tungsten," Robert W. Geehan; "Manganese," Norwood B. Melcher and E. J. Gealy; and "Molybdenum," Robert W. Geehan. (A4)

96-A. Foundrymen Note New Capital Outlays for Producton of Ductile Iron. *Inco Magazine,* v. 25, Winter, 1951-52, p. 9-10, 29.

Utility of ductile iron, its advantageous properties and versatility. (A4, E11, Q, general, CI)

97-A. Growth of the Magnesium Industry. J. D. Hanawalt. *Magazine of Magnesium,* Feb. 1952, p. 10-13.

A survey. Growth curves are presented. (A4, Mg)

98-A. The Combustion Gas Turbine—A New Tool for the Power Engineer. Part II. W. B. Wilson. *Blast Furnace and Steel Plant,* v. 40, Feb. 1952, p. 226-227.

Advantages of the combustion gas turbine in the steel industry. Compares gas-turbine and steam-turbine plants. (A5, Fe, ST)

99-A. Investment Growth in the Iron and Steel Industry. *Canadian Metals,* v. 15, Feb. 1952, p. 8-9.

A survey of investment, plant expansion, employment, and profits during the period 1926-1950 as shown in the Federal Government's study of investments in Canada. (A4, Fe, ST)

100-A. New Plants and Facilities Underway in 1951. A Partial Listing of U. S. Plants and Facilities—in or Related to the Chemical Process Industries—Either Planned, Under Construction, or Completed During 1951. *Chemical Engineering,* v. 59, Feb. 1952, p. 175-185.

Includes metal-production facilities. (A4)

101-A. India's Iron and Steel Industry. *Journal of Metals,* v. 4, Mar. 1952, p. 252.

The present status and expected future developments. (A4, Fe, ST)

102-A. Zinc and Lead. Otto Herres. *Mining Congress Journal,* v. 38, Feb. 1952, p. 59-61, 80.

An economic review. (A4, B general, Zn, Pb)

103-A. Copper. Tom Lyon. *Mining Congress Journal,* v. 38, Feb. 1952, p. 77.

Reviews the Cu situation with respect to supply, demand, expansion and cost. (A4, B general, Cu)

104-A. Tungsten, Mercury, and Chrome. Ira B. Joralemon. *Mining Congress Journal,* v. 38, Feb. 1952, p. 78-80.

An economic review. (A4, B general, W, Hg, Cr)

105-A. Antimony. James P. Bradley. *Mining Congress Journal,* v. 38, Feb. 1952, p. 80.

Supply and demand situation. (A4, B general, Sb)

106-A. Aluminum and Magnesium. Lawrence Litchfield, Jr. *Mining Congress Journal,* v. 38, Feb. 1952, p. 86-87.

An economic review.
(A4, B general, Al, Mg)

107-A. Iron Ore. R. T. Elstad. *Mining Congress Journal,* v. 38, Feb. 1952, p. 88-89.

An economic review.
(A4, B general, Fe)

108-A. The Domestic Manganese Picture. Arthur Linforth. *Mining Congress Journal,* v. 38, Feb. 1952, p. 104-106.
(A4, Mn)

109-A. Silver Developments in 1951; Tight Supply Plus Increased Demand Will Force Rise in Ceiling Price. Pat McCarran. *Mining Congress Journal,* v. 38, Feb. 1952, p. 107-108, 123.
(A4, Ag)

110-A. Gold; Long Range Outlook Brighter Despite Decreased World Production and Inflation. Robert W. Bachelor. *Mining Congress Journal,* v. 38, Feb. 1952, p. 109-110, 127.

Surveys the economic situation.
(A4, Au)

111-A. Iron and Steel Scrap. James E. Larkin. *Mining Congress Journal,* v. 38, Feb. 1952, p. 115-116.

Surveys the ferrous scrap situation. (A8, Fe)

112-A. Nonferrous Scrap Metals. Archie J. McDermid. *Mining Congress Journal,* v. 38, Feb. 1952, p. 117-118.

An economic survey. (A8, EG-a)

113-A. The Current World Lead Situation. Future Trends Dependent on International Political Developments. R. L. Wilcox. *South African Mining and Engineering Journal,* v. 62, Aug. 18, 1952, p. 1037, 1039, 1041.

Reviews the over-all production and consumption of Pb in 1950, as a means of better appraising and evaluating the current and likely immediate future situation.
(A4, Pb)

114-A. Toned-Down Noise Tunes up Operations. Charles E. Crede. *Steel,* v. 130, Feb. 25, 1952, p. 76-77. (A condensation.)

Factors contributing to the noise level in metalworking. A few ways to combat this problem.
(A5, F general, G general)

115-A. Metals for a New Kind of World. *Business Week,* Mar. 1, 1952, p. 19-20.

The expansion program planned for Al, Cu, Pb and Zn.
(A4, Al, Cu, Pb, Zn)

116-A. How Stoves and Ranges Are Made in the Pacific Northwest. Howard E. Jackson. *Finish,* v. 9, Mar. 1952, p. 25-28, 57.

Fabrication, finishing, welding, and assembly operations for production of appliances at Pacific Stove & Foundry Co., Seattle, Wash. Parts are fabricated from gray cast iron. (A5, T10, CI)

117-A. Dollar-Sign Engineering. L. D. Miles. *General Electric Review,* v. 55, Mar. 1952, p. 58-59.

Four years ago General Electric's purchasing department undertook a new project on the basic value of every part, every item, of a piece of apparatus. Some of the questions raised were: What does the item do? How important is it in relation to the other parts? Can we eliminate it or simplify it? Can we replace it with a standard? Can it be combined with another part? Can it be made from some other material at a lower cost—and better value? Outlines ten tests of value which are applied. Includes three case histories in parts fabrication.
(A4, G general)

118-A. The Iron and Steel Industry in India. John E. Brush. *Geographical Review,* v. 42, Jan. 1952, p. 37-55.

An extensive economic survey. 48 ref. (A4, Fe, ST)

119-A. Salvage Plan Reuses 78 Pct of Scrap Carbide. W. M. Halliday. *Iron Age,* v. 169, Mar. 6, 1952, p. 208-210.

Utilization and application of scrap carbide. (A8, C-n)

120-A. Some Recent Advances in Metallurgy. G. P. Contractor and B. S. Sreekantiah. *Journal of Scientific & Industrial Research,* v. 11A, Jan. 1952, p. 20-23.

25 references. (A general, Fe, ST)

121-A. Utilization of Byproducts and Waste Products of the Fatty Oil Industry. Part I. Recovery of Nickel From Spent Nickel Catalyst. G. K. Belekar, J. G. Kane, and H. S. Shahani. *Journal of Scientific & Industrial Research,* v. 11B, Jan. 1952, p. 28-30.

Samples of spent Ni catalyst from different factories were analyzed and a method for the recovery of Ni by digesting the spent catalyst with H_2SO_4-HNO_3 mixtures developed. A recovery of 93-98% is reported. 27 ref. (A8, Ni)

122-A. Claims Copper Shortage not Permanent and It May End Sooner Than Govt. Officials Predict. Simon D. Strauss. *Metals,* v. 22, Feb. 1952, p. 7-8, 19.
(A4, Cu)

123-A. Urges Decontrol of Prices on Lead and Zinc; Attributes Metal Shortages to Govt. Ceilings. Felix Edgar Wormser. *Metals,* v. 22, Feb. 1952, p. 9-10, 17, 19.
(A4, Pb, Zn)

124-A. Metallurgical Fume and Flue Dusts. C. C. Downie. *Mining Magazine,* v. 86, Feb. 1952, p. 30-83.

Methods of handling fume and flue dust at large metallurgical works. The recovery of Se and Te. (A8, B general, Se, Te)

125-A. Aluminum—Today and Tomorrow. Irving Lipkowitz. *Modern Metals,* v. 8, Feb. 1952, p. 25-27.

Surveys production of Al in the U. S. Advantages for the increasing use of this material nad future expected markets. (A4, T general, Al)

126-A. Waste Treatment Layout for a Job Plating Shop; A Case History. Leslie E. Lancy, and H. F. Hanson. *Plating,* v. 39, Mar. 1952, p. 250-254. (A8, L17)

127-A. Recovery of Chromic Acid From Plating Operations. F. R. Keller, C. C. Cupps, and R. E. Shaw. *Sewage and Industrial Wastes,* v. 24, Feb. 1952, p. 202-206; disc., p. 206.

Installation of a recovery system at Standard Steel Spring Co., Newton Falls, Ohio. Flow diagram shows plating cycle as altered to recover chromic acid, showing designed flow rates and equilibrium concentration of CrO_3. (A8, L17)

128-A. The Plating Wastes Problem From the Electroplater's Viewpoint. A. K. Graham and H. L. Pinkerton. *Sewage and Industrial Wastes,* v. 24, Feb. 1952, p. 207-210; disc., p. 210-211.

An attempt is made to define the electroplating industry and the nature of plating wastes. A distinction is made betwen plants discharging waste into public waters and into municipal sewers. The interdependence of the sanitary engineer and electroplating engineer, for successful handling of plating waste problems. (A8, L17)

129-A. The Scarcity of Some Important Metals and Possibilities of Coping With It. (In Dutch.) E. M. H. Lips. *Metalen,* v. 6, Nov. 30, 1951, p. 422-427.

Aspects of structural steel, stainless steel, use of scrap, high speed steel, and nodular cast iron. Data are tabulated and charted. (A general, ST, CI)

130-A. The Importance to Engineers of a Knowledge of Materials. (In German.) Werner Koster. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, Feb. 1, 1952, p. 89-94.

The basic knowledge of metallurgy which an engineer should be acquainted with. Graphs and photomicrographs. (A3)

131-A. (Book) **Machine and Tool Blue Book.** 1952 Directory. 450 pages. 1951, Hitchcock Publishing Co., 222 E. Willow Ave., Wheaton, Ill.

Sources of supply for the metalworking industry. (A10)

132-A. (Book) **Operational Research; Its Application to Peace-Time Industry.** 151 pages. 1949-1950. Manchester Joint Research Council, Manchester, England.

Means by which an understanding of scientific facts can best be conveyed to the world of industry. Preface, introduction, papers by five research directors, open forum, and a brief bibliography. (A9, A3)

133-A. (Book) **The Wealth of India. Industrial Products. Vol. II. Part II.** B. N. Sastri, editor. 251 pages. 1951. Government of India Press, New Delhi.

Industrial products of India, whose names begin with the letter "C". Includes both technical and economic information. Numerous illustrations and tables. (A general)

134-A. How to Stimulate Production of Base Metals in the Americas. Charles Will Wright and Lester G. Morrell. *Engineering and Mining Journal,* v. 153, Mar. 1952, p. 80-83.

Surveys world production and consumption of Cu, Pb, and Zn. The supply situation in the U. S. and the Americas. Data are graphed. (A4, B10, Cu, Pb, Zn)

135-A. Steel Industry. Richard D. Hoak. *Industrial and Engineering Chemistry,* v. 44, Mar. 1952, p. 513-520.

An outline of waste disposal and utilization practices in the steel industry. 25 ref. (A8, ST)

136-A. Brass and Copper Industry. F. X. McGarvey, R. E. Tenhoor, and R. P. Nevers. *Industrial and Engineering Chemistry,* v. 44, Mar. 1952, p. 534-541.

Recent studies on typical mill rinses have shown that cation exchangers operating in the sodium or hydrogen cycle might be employed successfully to concentrate Cu, Zn, and Cr solutions. The economics of the exchange in the hydrogen cycle indicate that profitable recovery of Cu might be accomplished in conjunction with an electrodeposition process in the Cu pickle itself. Flow rate and influent concentration have a marked effect on the economics of the process. Tables and graphs. 15 ref. (A8, Cu)

137-A. Sulfuric Acid Recovery From Waste Liquors. F. J. Bartholomew. *Industrial and Engineering Chemistry,* v. 44, Mar. 1952, p. 541-545.

A practical method for recovering H_2SO_4 from steel-mill and titanium-pigment-plant solutions by concentrating the free acid, removing the

iron sulfate by salting out, and then decomposing the sulfate for recovery of its acid values. A new method of supplying heat to concentrate the liquor improves fuel efficiency and makes the recovery possibilities somewhat more attractive. The economic aspects of these problems are stressed. (A8)

138-A. High Purity Spongelike Copper From Waste Pickling Sludge. Robert L. Rusher and George W. Blum. *Industrial and Engineering Chemistry,* v. 44, Mar. 1952, p. 660-664.

The material prepared from the brass and Cu products industry, shows evidence of possessing extremely large surface and high chemical activity. Photomicrographs. 14 ref. (A8, Cu)

139-A. Pigment Grade Iron Oxides; Recovery From Iron-Containing Waste Liquors. C. C. DeWitt, M. D. Livingood, and K. G. Miller. *Industrial and Engineering Chemistry,* v. 44, Mar. 1952, p. 673-678.

Two pilot plants, adaptable to the production of various synthetic iron oxides from iron-containing solutions such as waste pickle liquors. Data are tabulated. 26 ref. (A8, Fe)

140-A. Industrial Wastes. Harold R. Murdock. *Industrial and Engineering Chemistry,* v. 44, Mar. 1952, p. 105A-106A, 108A.

Surveys treating methods available for reducing cyanide waste solutions to harmless waste waters for disposal in streams. (A8)

141-A. Iron Ore in 1951. *Skillings' Mining Review,* v. 40, Mar. 15, 1952, p. 1-2.

Statistical summary of iron-ore production and shipments from the U. S. for 1951. (A4, Fe)

142-A. 1951 L. S. Iron Ore Shipments by Mines. *Skillings' Mining Review,* v. 40, Mar. 22, 1952, p. 1-2.

Brief report of Lake Superior region iron ore shipments. (A4, Fe)

143-A. Rebirth of An Industry. Margot Shore. *Steelways,* v. 8, Mar. 1952, p. 28-29.

Industrial potentialities of France with respect to iron-ore reserves and steel production. (A4, B10, Fe, ST)

144-A. Nonferrous Metals in the Year 1951. (In German.) Heinrich Sennekamp. *Metall,* v. 6, Jan. 1952, p. 31-37.

Statistical data on production and consumption, of nonferrous metals in Germany in 1951. (A4, EG-a)

145-A. Development of the Light-Metal-Ware Industry in 1951. F. S. Behrens. (In German.) *Metall,* v. 6, Mar. 1952, p. 145-146.

A survey, giving some statistics, mainly for Germany. Includes Al foil, metal powders, sprayed parts, tubing, etc. (A4, Al)

146-A. The Aluminum Industry of Yugoslavia. (In German.) *Metall,* v. 6, Mar. 1952, p. 154.

Reviews latest development on the basis of the literature, such as the building of new plants and the enlargement of existing ones. Projected production. (A4, Al)

147-A. More Unsolved Problems; Additional Research Projects From ASTM Committees. *American Society for Testing Materials,* Feb. 1952, p. 19-20.

Unsolved problems, the present state of knowledge, questions to be answered, and introductory references. Problems include study of crack genesis and growth in steel. (A9)

148-A. Lone Star Steel Hitches Its Wagon to the Oil Industry. *Business Week,* Mar. 29, 1952, p. 64-66, 69.

Organization, financing, and layout of Texas company, most of whose steel is earmarked for the state's booming oil industry. (A5, ST)

149-A. Substitution for Strategic Metals in Steel Production. S. L. Gertsman. *Canadian Metals,* v. 15, Mar. 1952, p. 20, 22-23; Apr. 1, 1952, p. 24-25.

Deals specifically with present shortages of Ni, Mo, W, Co, Cb, and Mn and what to do about them. (A4, T general, AY)

150-A. Research Mission to Europe. Harold Vagtborg. *Chemical and Engineering News,* v. 30, Mar. 31, 1952, p. 1278-1281, 1338.

Tour was made by a group of administrators from U. S. research institutes to determine the means by which industrial research in each country visited might be encouraged, strengthened, and coordinated. (A9)

151-A. Regeneration of Sulphuric Acid in Waste Pickle Liquors. E. W. Mulcahy. *Industrial Chemist and Chemical Manufacturer,* v. 28, Mar. 1952, p. 125-129.

Methods employed in the metallurgical industry. Emphasizes ferrous and copper plant wastes. (A8, L12, Fe, Cu)

152-A. Effect of CaO:MgO Ratio in the Neutralization of Pickle Liquor. Francis J. Clauss and Lloyd E. Brownell. *Iron and Steel Engineer,* v. 29, Mar. 1952, p. 63-70.

A CaO:MgO ratio of about 96:4 gives best rates of filtration for neutralized slurry. Presents graphically the relationships between vol-

ume of filter cake, filtration rates, lime composition, and operating-pressure drop during filtration. (A8, L12)

153-A. Gold Scrap Recovery Methods Applicable to Scarce and Costly Materials. Bernard Blackman and Carl Heinzman. *Materials & Methods,* v. 35, Mar. 1952, p. 102-104.

Program of Keystone Watch Case Div., Riverside Metal Co. Applicability to other types of metalworking industries. (A8, Au, EG-c)

154-A. IMC Plays Vital Role in Offsetting Shortages of Materials Threatening Defense Production. Edmund E. Getzin. *Metals,* v. 22, Mar. 1952, p. 7-8, 17.

Refers to International Materials Conference, its role and accomplishments. (A4)

155-A. Canadian Copper, Lead and Zinc Prices in 1951 Chiefly Influenced by Prevailing U. S. Levels. Egmont Frankel. *Metals,* v. 22, Mar. 1952, p. 9, 17.

Review of the nonferrous metal business during 1951. (A4, Cu, Pb, Zn)

156-A. The Aluminum Shortage is Ending! *Modern Metals,* v. 8, Mar. 1952, p. 41-44. (Based on talk by W. B. Griffin.)

Reviews new applications of Al and its alloys. Supply trends. (A4, T general, Al)

157-A. The Zinc Situation. Wallace G. Woolf. *Western Miner,* v. 25, Mar. 1952, p. 35-37.

Properties and uses of Zn, industrial development, and government control. (A4, Zn)

158-A. Metallurgy. A. P. Wichmann. "Encyclopedia of Chemical Technology. Vol. 8" (Interscience Encyclopedia, New York), 1952, p. 934-944.

Divides the subject of metallurgy into two major parts, namely: extractive or production metallurgy, and adaptive or utilization metallurgy. Each is briefly discussed under several broad headings. (A general)

159-A. A Review of the War-Time Activities of the Newcastle Steel Plant of the Broken Hill Pty. Co. Ltd. and Its Associated and Subsidiary Industries. D. O. Morris. *Australasian Institute of Mining and Metallurgy, Proceedings,* new ser., Mar. 31-June 30, 1947, p. 69-139.

A detailed review of facts and figures. (A4, ST)

160-A. Stainless Foundry Pays Off Double. *Business Week,* Apr. 5, 1952, p. 100.

Stainless steel conservation at Solar Aircraft Co., San Diego, Calif., which installed a foundry to utilize its own scrap. (A8, E general, SS)

161-A. What's Ahead for Steel? Kenneth S. Harris. *Canadian Metals* v. 15, Apr. 1, 1952, p. 8-9.

A brief survey of the status of steel production and supply in Canada. Predicts 1,000,000-ton capacity increase by 1953. (A4, ST)

162-A. Scoreboard for Metals. H. McLeod. *Canadian Metals,* v. 15, Apr. 1, 1952, p. 10-12.

Latest official statistics on Canada's metalworking industries, for iron and steel production, nonferrous metals, and manufactured products. (A4)

163-A. Metalworking Facts and Figures. *Canadian Metals,* v. 15, Apr. 1, 1952, p. 14-20.

Annual issue of tabular information on every branch of the Canadian metalworking industries, compiled by Dominion Bureau of Statistics. (A4)

164-A. Sulphuric Acid and Liquid Sulphur Dioxide Manufactured From Smelter Gases at Copper Cliff, Ontario. R. W. Allgood. *Canadian Mining and Metallurgical Bulletin,* v. 45, Mar. 1952, p. 153-155; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 55, 1952, p. 123-125.

The general factors associated with the recovery of sulfur in smelter gases, in view of the current sulfur shortage. Flow sheets. (A8)

165-A. What Forces Affect Availability and Substitution of Materials? Franklin P. Huddle. *Electrical Manufacturing,* v. 49, Apr. 1952, p. 128-131, 312, 314, 316, 318, 320, 322, 324.

A discussion for the product design engineer. Such factors as international tensions, military planning, strategic geographic availability, and economic trends here and abroad. Includes a table of relative availability of selected basic materials. (A4, B10)

166-A. Recovery of Nickel & Zinc From Silver Refinery Waste Liquors. Part I. Recovery of Nickel by Electro-Deposition. N. G. Banerjee and T. Banerjee. *Journal of Scientific & Industrial Research,* v. 11B, Feb. 1952, p. 76-78.

Tables and graphs. (A8, C23, Ni, Zn, Ag)

167-A. (Book) Alcoa, an American Enterprise. Charles C. Carr. 292 pages. Rinehart & Co., New York. $3.50.

History of Aluminum Co. of America from Charles Martin Hall's discovery of a cheap method of turning bauxite into aluminum by electrolysis to the present wide applica-

tion of the metal. Pioneering days in the 1880's, the early struggles for patent rights, for financial backing, for consumer markets. (A2, Al)

168-A. (Book) **Applied Research in the United States.** Eugene W. Scott, Ed. 90 pages. 1952. National Academy of Sciences and National Research Council, Washington, D. C.

American practices in the organization, administration, and financing of applied research in natural sciences and engineering. Way in which new results found in the research laboratory are communicated to those responsible for their practical utilization. Directed mainly toward administrators of research in governments and industries of other countries. Appendix lists research and development facilities of U. S. Government departments and agencies. 45 ref. (A9)

169-A. (Book) **Case Study Data on Productivity and Factory Performance —Gray Iron Foundries.** 100+ pages. U. S. Dept. of Labor, Washington, D. C.

Statistical information based on a survey of 20 foundries. Includes tables on unit man-hour data, cupola operation and structure, pattern data, molding information, etc. (A6, E11, CI)

170-A. (Book) **Hearings Before the Subcommittee on Study of Monopoly Power of the Committee on the Judiciary House of Representatives, Eighty-Second Congress, First Session. Serial No. 1. Part 1. Aluminum. Part 4. Mobilization Program.** 916 and 1060 pages. 1951. U. S. Government Printing Office, Washington.

(A6, Al)

171-A. (Book) **The National Research Council Review.** 285 pages. 1951. Council on Scientific and Industrial Research, Ottawa, Ont., Canada.

Brief introductory summary of organization and activities, detailed summaries of the activities of each division and subdivision, committee reports, administrative information, and staff directory. (A9)

172-A. (Book) **Notes on the Prehistoric Metallurgy of Copper and Bronze in the Old World.** H. H. Coghlan. 131 pages. 1951. Oxford University Press, Amen House, Warwick Sq., London EC. 4, England.

Native copper and the ores from which prehistoric nonferrous metals were obtained; analyses and metallography as means of distinguishing the various metals; mechanical properties of copper and bronze; the casting process: furnaces. bellows, and crucibles; methods of working the metals; results of metallurgical examination; examination of specimens from the Pitt Rivers Museum; bronze castings in ancient mounds; and related subjects. Includes 4-page bibliography, diagrams, photographs, and micrographs. (A2, Cu)

173-A. (Book) **Scientific and Learned Societies of Great Britain.** Ed. 57. 227 pages. 1951. George Allen & Unwin, Ltd., 40 Museum St., London W. C. 1, England.

Part 1 deals with the organization of scientific research in Great Britain, and gives the names and addresses of the main research establishments administered by the Department of Scientific and Industrial Research, the Medical Research Council, the Agricultural Research Council, and the research associations. A chart shows the relationships which exist between bodies engaged in scientific research in Great Britain. Part 2 gives details of more than 600 societies in Great Britain, including objects and publications, membership subscriptions, meeting times, and principal officers. The societies are listed alphabetically, and are classified. (A9)

174-A. (Book) **The Story of Dixisteel; the First Fifty Years 1901 to 1951.** Charles F. Stone. 177 pages. 1951. Atlantic Steel Co., Atlanta, Ga.

History and growth of the Atlantic Steel Co. Includes a summary of the activities in which the company is now engaged. (A2, D general, ST)

175-A. Steel and the National Economy; a Survey of Current and Future Supplies and Demand. R. M. Shone. *Iron and Steel,* v. 25, Apr. 1952, p. 121-122.

(A4, ST)

176-A. Are Metal Shortages Permanent? Simon D. Strauss. *Mines Magazine,* v. 42, Mar. 1952, p. 45-47, 88, 93.

Emphasis on steel, Cu, and Al. (A4, ST, Cu, Al)

177-A. Minor Metals are Major Issue. J. L. Bray. *Steel,* v. 130, Apr. 21, 1952, p. 80-82.

General discussion with respect to new sources sought, applications, and future supplies for Ni, Cr, Co, W, Cb, Ta, and Ti. (A4, Ni, Cr, Co, W, Cb, Ta, Ti)

178-A. Lagooning Purifies Metalworking Wastes. *Steel,* v. 130, Apr. 14, 1952, p. 98-100.

Previously abstracted from "Purification of Wastes in a Metalworking Plant by Lagooning". Charles R. Griffith. *Proceedings of the Sixth Industrial Waste Conference (Purdue Univ.).* See item 44-A, 1952. (A8)

179-A. Italian Iron and Steel Production; New Cornigliano Plant as Part of Modernization Scheme. *Times Review of Industry,* v. 6, Apr. 1952, p. 84.

(A5, Fe, ST)

180-A. The New Metals. *Analysts Journal,* v. 8, Jan. 1952, p. 95-104.

Verbatim report of speeches presented at the Eastern Regional Conference, New York Society of Security Analysts. General topics are "Titanium"; "Future Markets for Aluminum"; "Other New Metals". (A4, Ti, Al)

181-A. Research in Steel. R. E. Zimmerman. *Analysts Journal,* v. 8, Mar. 1952, p. 19-21.

Need for and development of research in reference to the over-all economy. (A9, ST)

182-A. Metals and Alloys of Today and Tomorrow. H. W. Greenwood. *Engineer,* v. 193, Apr. 18, 1952, p. 540-541.

Rapid increase in variety of materials available to engineers and large increase in metallurgists' knowledge. Effect of impurities in controlling reactions involved in hardening processes. Importance of using purer metals commercially and industrially. Further references to Ti alloys and to powder metallurgy, infiltration and the use of coated powders. (A general)

183-A. Ion Exchange Saves Chromic Acid. *Iron Age,* v. 169, May 1, 1952, p. 152.

Ion exchange is being successfully used by an Eastern aircraft manufacturer to recover valuable Cr and CrO_4 from plant waste. (A8, Cr)

184-A. Heat Relief in Industry. Bartlett R. Small. *Iron and Steel Engineer,* v. 29, Apr. 1952, p. 71-77; disc. p. 77-83.

Various methods. Ventilators, radiant-heat shielding, and local cooling. Radiation is probably the major cause of discomfort. Table of emissivities of several metals. (A5, P17)

185-A. Manganese for the Steel Industry. F. W. Boulger and R. C. Buehl. *Journal of Metals,* v. 4, May 1952, p. 468.

Future sources of supply; methods for recovery of Mn from slag. (A8, Mn, ST)

186-A. U. S. 1952 Slab Zinc Needs Put At 889,000 Tons With 1,018,000 Tons Available for Consumption. C. R. Ince. *Metals,* v. 22, Apr. 1952, p. 7, 17. (A condensation.)

(A4, Zn)

187-A. Finds Little Excuse for Government Officials Seeking to Compel Use of Copper Substitutes. Louis S. Cates. *Metals,* v. 22, Apr. 1952, p. 8.

Excerpts of remarks at stockholders meeting of Phelps Dodge Corp. (A4, Cu)

188-A. Economical Use of Aluminum. (In German.) K. Specht. *Aluminium,* v. 28, Mar. 1952, p. 76-77.

Nomogram and table permit determination of cost savings due to weight reduction made possible by substitution of common Al alloys for steel or cast iron. (A4, Al)

189-A. Problem of Producing and Selling Tin. (In Portuguese.) Ciro T. De Padua. *Engenharia, Mineracao e Metalurgia,* v. 16, Mar. 1952, p. 413-416.

Attempts at cartelization of the industry, new method of producing tinned sheet, future prospects of the tin market, and influence of Bolivian foreign policy on tin production. (A4, Sn)

190-A. Profitable Chromate Wastes. C. F. Paulson. *Metal Finishing,* v. 50, May 1952, p. 48-50, 56.

A process operating on a commercial scale which eliminates stream pollution and returns the chromate in usable form to the treatment bank. (A8, L14, Cr)

191-A. "Residues to Metals". *Metal Industry,* v. 80, Apr. 25, 1952, p. 329-330.

L. H. Dowling and Sons, a British firm, claim to have solved the problem of extracting the total metallic content from nonferrous residues. It can treat residues containing over 15% metallics. Test results obtained on some brass residues are tabulated. Appearance of various fractions of original material and concentrates. No details of the process. (A8, Cu)

192-A. Gold, Silver and Jewellery Industries—Report on Research Progress 1950-51. *Metallurgia,* v. 45, Apr. 1952, p. 195.

Brief summary of metallurgical problems being studied at the research center of the above industries. (A9, Au, Ag, EG-c)

193-A. A Dictionary of Metallurgy. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging,* v. 19, Feb. 1952, p. 51-60; Mar. 1952, p. 115-122; April 1952, p. 175-182.

Begins listing of definitions of metallurgical terms. Feb. issue covers "A"—"Argon"; Mar. issue, "Argon"—"Bingham's Etch"; Apr. issue, "Biotite"—"Browning"; (to be continued.) (A10).

194-A. The Supply and Industrial Applications of Scrap Metals. H. J. Miller. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources," 1951, p. 24-32; disc., p. 35-39.

Estimates of the world's total store of metals, derived by use of certain assumed recovery factors for individual metals. From statistical data available in both the U. S. and the United Kingdom for Cu, Pb, Zn, Al, and other metals, estimates are made of the probable supply position for scrap, relative to virgin metals. Uses of both old and new scrap, and difficulties involved in utilizing scrap so that the products comply with modern specifications. (A8)

195-A. Treatment of Waste Gases. Walter A. Schmidt. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 183-190; disc., p. 204-210.

Especially as applied to gaseous wastes from the metallurgical industries. The various types of recovery methods, and advantages and disadvantages. 37 ref. (A8)

196-A. The Conservation of Lead. J. Faye. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 194-197; disc., p. 204-210.

Production, resources, uses, and possibilities for substitution of other metals and alloys for Pb.
(A general, B10, Pb)

197-A. The Conservation of Non-Ferrous Metals. Jiri Sequens. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 197-203; disc., p. 204-210.

Surveys various possibilities.
(A general, EG-a)

198-A. The Past, Present, and Future of the Canadian Steel Industry. J. Convey and S. L. Gertsman. *Canadian Mining and Metallurgical Bulletin,* v. 45, May 1952, p. 271-274; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 55, 1952, p. 181-184.
(A4, ST)

199-A. Malleable Castings in Western Germany. H. Moehl. *Foundry Trade Journal,* v. 92, May 1, 1952, p. 471-472. (Translated and condensed from *Giesserei.)*

Statistics covering production, personnel, etc. (A4, E11, CI)

200-A. Atmospheric Pollution. Louis C. McCabe. *Industrial and Engineering Chemistry,* v. 44, May 1952, p. 121A-122A.

Tests indicate that electrostatic precipitators, when operated wet, are highly efficient for the recovery of fumes and gases from Al alloy processing. (A7, Al)

201-A. The Economics of the Secondary Heavy Metals. E. H. Jones. *Journal of the Birmingham Metallurgical Society,* v. 32, Mar. 1952, p. 4-14.

See abstract of 'Secondary Heavy Metals", *Metal Industry;* item 34-A, 1952. (A8, B10)

202-A. The Industry in the World Today. *Light Metals,* v. 15, May 1952, p. 157-159.

Emphasizes impact of government controls on U. S. aluminum industry. Tabular data. (A4, Al)

203-A. Pressure on Producers Increases "Productivity" of Metal. *Metal Age,* May 1952, p. 4-8. (Based on paper by C. T. Saunders.)

The growth of manufacturing industry and the change in its structure was gaged by measuring the consumption of 16 major raw materials in the United Kingdom from 1851-1950. The summary is limited to seven metals: finished steel, iron products, Cu, Zn, Pb, Al, and Sn. Tables. (A4)

204-A. Outlook For Tin. Clyde Williams. *Monthly Business Review* (Federal Reserve Bank of Cleveland), v. 34, May 1952, p. 8.

New research developments in utilization and in conservation of tin, the supply situation, and future prospects. (A4, Sn)

205-A. A Critical Review of the Literature of 1951 on Sewage, Waste Treatment, and Water Pollution. W. Rudolfs. *Sewage and Industrial Wastes,* v. 24, May 1952, p. 541-641.

Review by the FSIWA Committee on Research. Analytical methods, sewage, industrial wastes, radioactivity, and water pollution. Specific topics of metallurgical interest include determination of cyanides and metallic ions; pickling and acid, and plating and cyanide wastes. 800 ref. (A8)

206-A. Iscor's Importance in the Union's Economy. *South African Mining and Engineering Journal,* v. 63, Mar. 15, 1952, p. 73, 75, 77; Mar. 22, 1952, p. 117, 119, 133.

A survey in reference to the state-sponsored organization, South African Iron and Steel Industrial Corp., Ltd. (A4, Fe, ST)

207-A. Profits From Metal Wastes. C. F. Paulson. *Water & Sewage Works,* v. 99, May 1952, p. 199-201.

New ion-exchange process using Permutit resins recovers chromic acid and demonstrates other operating advantages. (A8)

208-A. Turntable Speeds Heavy Scrap Cutting. *Welding Journal,* v. 31, May 1952, p. 421-422.

At Allegheny Ludlum Steel Corp., Brackenridge, Pa. (A5, G22, ST)

209-A. The Steel Industry of the World Under Great Stress. (In German.) Wilhelm Salewski. *Stahl und Eisen,* v. 72, Apr. 24, 1952, p. 453-459.

Economic analysis of expansion of the iron and steel industry throughout the world during the past 20 years. Graphs and tables. (A4, Fe, ST)

210-A. Critical Nickel Situation Discussed at ODM-ASTM Meeting. *ASTM Bulletin,* May 1952, p. 48-49.

List of measures and substitutes to aid in Ni conservation. (A4, Ni)

211-A. Manganese in Open Hearth Slags is Largest Potential Domestic Source. *Chemical and Engineering News,* v. 30, June 2, 1952, p. 2300-2301.

Two tentative chemical-recovery processes: ammonium carbonate leaching; and treatment with chloride at a temperature that will volatilize Fe and Mn chlorides and leave behind gangue material. (A8, Mn)

212-A. Contribution of Research to the Metallurgy of Cast Iron. Ralph V. Riley. *Foundry Trade Journal,* v. 92, May 15, 1952, p. 517-522.

Reviews established principles of testing methods for investigating the properties of cast iron, and achievements in cast iron research, including development of nodular cast iron. 11 ref. (A9, CI)

213-M. Monitoring Device for Use With an X-ray Diffraction Cylindrical Camera. M. S. Ahmed. *Journal of Scientifc Instruments,* v. 29, May 1952, p. 163-164.

A modified form of Goppel's camera, simpler to construct, and more siutable for use with a cylindrical film. (M22)

214-A. B. T. H. Research in 1951. *Metallurgia,* v. 45, May 1952, p. 251-252.

Brief references to some examples of metallurgical interest in British research laboratory. Creep of high-temperature alloys; welding techniques for turbine-rotor forgings; bonded silicides; magnetic sheet steel; machining research; infrared radiation pyrometer; and infrared photo-electric relays. (A9)

215-A. World Mine Zinc Output Expected to Exceed Smelter and Pigment Production This Year. Simon D. Strauss. *Metals,* v. 22, May 1952, p. 7, 9.

Data are tabulated. (A4, Zn)

216-A. Estimate Storage Battery Lead Consumption in 1952 at 388,048 Tons or 3.87% Over Last Year. R. L. Sommerville. *Metals,* v. 22, May 1952, p. 8, 15.

Industrial use may decrease 10%; in automotive field rise in government business will offset declines in other categories. (A4, Pb)

217-A. U. S. 120,000-Ton Slab Zinc Surplus in 1952 Seen Developing Entirely in Higher Grades. C. R. Ince. *Metals,* v. 22, May 1952, p. 9, 15. (A4, Zn)

218-A. Abstracting Journals; a Comparative Survey. *Metals Review,* v. 25, May 1952, p. 6-7, 12-14. (Extracts from "The Technical Society as a Library Resource", by Marjorie R. Hyslop. *Transactions* of the 41st Annual Convention, Special Libraries Association, 1951, p. 106-119.)

Four metallurgical abstract services were analyzed on the basis of five aspects: kind of abstract, whether informative, or indicative; timeliness; selectivity; source material; and subject matter. The services analyzed are: ASM Review of Metal Literature; Metallurgical Abstracts (Institute of Metals); Abstracts of Current Literature (Iron and Steel Institute); and Chemical Abstracts. (A10)

219-A. Three More Letters on the Dispute Over More Aluminum From Alcan. *Modern Metals,* v. 8, May 1952, p. 50, 52, 54-55.

The question of whether additional aluminum should be obtained from Aluminum Co. of Canada or from further expansion of primary smelting capacity in this country. Letters are from Dewey Anderson, defending his booklet "Aluminum for Defense and Prosperity" against the criticism of Sam Moment; from Congressman Emanuel Celler addressed to Sam Anderson, head of DPA's aluminum division; and from Arnold Troy of Eastern Metal Products Co. (A4, Al)

220-A. Average Analyses Lake Superior Iron Ores 1951 Shipments. *Skillings' Mining Review,* v. 41, June 7, 1952, p. 1-2.

Tabular data for tonnage shipments and average analyses of different types from each range. (A4, Fe)

221-A. The Outlook for Aluminum. David P. Reynolds. *Stove Builder,* v.

17, June 1952, p. 114, 116, 118, 120, 122, 124.

Ore deposits, production figures, and future markets. (A4, B10, A1)

222-A. Activities of the International Center for Development of Aluminum. (In French.) *Revue de l'Aluminium,* v. 29, Apr. 1952, p. 164-165.

Work of the various committees and the proposed program. Representatives of Germany, France, Italy, and Switzerland are included. (A9, A1)

223-A. The Iron and Steel Industry of Upper Silesia. (In German.) Karl Tanzer. *Stahl und Eisen,* v. 72, May 8, 1952, p. 569-574.

History and present status. (A2, A4, Fe, ST)

224-A. The Plating Wastes Problem from the Electroplater's Viewpoint. A. K. Graham and H. L. Pinkerton. *Plating,* v. 39, June 1952, p. 619-621.

Previously abstracted from *Sewage and Industrial Wastes;* see item 128-A, 1952. (A8, L17)

225-A. Annual Review—1952 Edition. *Mining Journal,* May 1952, 248 pages.

Contains a series of articles under each of the following headings: Review of the metals and minerals; mining and metallurgical developments during the year; the world's mining fields in 1951; and progress of the mining companies. Some individual articles are separately abstracted. (A general)

226-A. Review of the Metals and Minerals. *Mining Journal,* May 1952, p. 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29-31, 33, 35, 37, 39, 41, 43, 45-47, 49, 51, 53-55, 57, 59, 61.

A series of economic reviews for 1951 covering: Au, Ag, Pt metals, Cu, Sn, Pb, Zn, Al, Mg, Be, Sb, Ni, Co, Ti, Mn, W, Mo, Fe and steel, and some nonmetallic industries. (A4)

227-A. The World's Mining Fields in 1951. *Mining Journal,* May 1952, p. 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129-131, 133, 137-139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159.

A series of primarily economic reviews presented by country or geographical area. (A4, B10)

228-A. (Book) **Air Pollution: Proceedings of the United States Technical Conference on Air Pollution.** Louis C. McCabe, chairman. 847 pages. 1952. McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y.

97 papers subdivided as follows: 14 on agricultural aspects; 14 on analytical methods and properties; 24 on control equipment and procedures; 14 on health aspects; 14 on instrumental methods for investigation or recording of air pollutants; 9 on legislative aspects; and 8 on meteorological aspects. (A7)

229-A. (Book) **Basic Engineering Metallurgy.** Carl A. Keyser. 384 pages. Prentice-Hall, Inc., 70 Fifth Ave., New York 11, N. Y. $8.00.

Theories, principles, and applications of engineering metallurgy. Intended to serve, primarily, students in all branches of engineering. Mechanism of metal failure. Properties, applications, and fabrication of nonferrous metals. Advantages, limitations, and control of the various means of fabricating metals. Primary and secondary methods of mechanical working, joining, fabrication. (A general)

230-A. (Book) **A Century of Technology: 1851-1951.** Percy Dunsheath, editor. 346 pages. 1951. Hutchinson's Scientific and Technical Publications, 47 Princes Gate, London S. W. 7, England.

General plan of each chapter is to summarize 100 years of progress in a specific field, with an indication of outstanding events and personalities responsible for the progress. (A2)

231-A. (Book) **Die Metallwirtschaft der Schweiz und ihre Nebengebiete.** (The Swiss Metal Industry and Its Subsidiary Branches.) 120 pages. 1951. Verlag für Wirtschaftsliteratur G.m.b.H., Zurich 55, Switzerland.

Contains a list and index of all firms in the metal industry, arranged according to their specialized fields, such as iron and steel foundries, nonferrous metal foundries, commercial firms for various types of metal products, etc., and also a list of their professional organizations. (A10)

232-A. (Book) **Grundlagen der Metallkunde in anschaulicher Darstellung.** (Fundamentals of Metallurgy in Graphic Presentation.) Ed. 3. Georg Masing. 148 pages. 1951. Springer-Verlag, Berlin, Germany.

Basic facts of metallurgy and their relationship to technology. Atomic structure of metals and alloys, formation of solid solutions, thermal treatments, plastic deformation, stresses, recrystallization, and chemical behavior of metals toward nonmetallic corroding agents. Many charts, diagrams, and tables. (A general)

233-A. (Book) **Metall- und Legierungsregister.** (Handbook of Metals and Alloys.) Walter Krauskopf. 144 pages. 1950. Carl Hanser Verlag, Munich, Germany.

Lists in alphabetical order about

1800 old and new metals and alloys by terms and trade names. The metals are defined by composition and their uses, properties, and producer's names are indicated. (A10)

234-A. (Book) **V. E. Grum-Grzhimailo Cobranie Trudov.** (V. E. Grum-Grzhimailo's Collected Works.) I. P. Bardin, editor. 246 pages, 1949. Academy of Sciences of the USSR, Section of Technical Sciences, Moscow and Leningrad, U.S.S.R.

Collected writings of one of the founders of the metallurgical sciences in Russia. Published as a memorial on the occasion of the 12th anniversary of his death. (A2)

235-A. Save by Briquetting Borings. *American Foundryman,* v. 21, June 1952, p. 40-41.

Equipment and procedure of Stockham Valves & Fittings, Inc., Birmingham, Ala., for briquetting gray-iron and malleable borings and turnings for use as scrap. (A8, CI)

236-A. Atmospheric Pollution. Louis C. McCabe. *Industrial and Engineering Chemistry,* v. 44, June 1952, p. 103A-104A, 106A.

Tests indicate that two or more types of equipment may be required to control gases from gray-iron foundries since no single, inexpensive, dust-recovery principle seems adequate. (A7, E11, CI)

237-A. Treating Industrial Wastes at National Carbon. C. F. Pearson. *Industry and Power,* v. 62, June 1952, p. 78-80.

Procedures and equipment for disposal of plating and pickling wastes at National Carbon's St. Albans, Vt., plant. (A8, L12, L17)

238-A. Do Foreign Machine Tools Menace U. S. Builders' Markets? Max Leach. *Iron Age,* v. 169, June 19, 1952, p. 150-152.

(A4)

239-A. Price-Volume Ratios for Plastics and Metals. *Materials & Methods,* v. 35, June 1952, p. 137.

Information presented graphically. (A4)

240-A. Tinplate Demand and Supply. *Metal Bulletin,* June 6, 1952, p. 17-20.

Based on an examination, by J. Ryan, of likely supply and demand for tinplate throughout the world during the next four years in order to estimate whether or not the current increases in tinplate manufacturing capacity will be sufficient to meet the demand. Tables. (A4, Sn, CN)

241-A. Neutralization of Waste Pickle Liquor. *Metal Progress,* v. 67, June 1952, p. 156, 160. (Condensed from "Acid Iron Wastes Neutralization", Richard D. Hoak.)

Previously abstracted from *Sewage and Industrial Wastes.* See item 77-A, 1950. (A8)

242-A. The Manganese Situation. Rowland King. *Western Miner,* v. 25, June 1952, p. 54.

Present status of the Mn ore situation in the U. S. Compares domestic and foreign production for the past decade. Statistics from the Minerals Yearbook of the U. S. Bureau of Mines. (A4, Mn)

243-A. (Italian.) **Laboratory of Electrochemistry, Chemistry, Physics, and Metallurgy of the Polytechnic Institute of Milan.** R. Piontelli. *Metallurgia Italiana,* v. 44, May 1952, p. 184-192.

Illustrated description of facilities of the different sections. List of publications, 1948-1952. (A9)

244-A. Foundation for Growth and Security. *Chemical and Engineering News,* v. 30, July 7, 1952, p. 2798-2800, 2873.

Reviews first volume of series of reports prepared by the President's Materials Policy Commission. Graphs show present status and future prospects of U. S. materials supply and consumption. Recommendations. (A4)

245-A. Mechanized System Launches New Era for Literature Searching. *Chemical and Engineering News,* v. 30, July 7, 1952, p. 2806, 2808, 2810.

Reviews proceedings of recent MIT meeting on mechanized literature searching and associated problems. A new IBM machine and search system. Exploratory work on coding systems, development of "machine language", a proposed ultra-high-speed electronic scanner, and the scientific literature problem which makes development of mechanized methods obligatory. (A9)

246-A. What *Can* Happen by 1962. *Chemical Engineering,* v. 59, June 1952, p. 389-390, 392-393.

Outlook for the process industries, including metalworking, based on a detailed survey made by McGraw-Hill's Dept. of Economics. Charts. (A4)

247-A. New Combustion Catalyst Beats Air Pollution. Arthur E. Uhleen. *Factory Management and Maintenance,* v. 110, July 1952, p. 124-125.

Houdry catalyst unit consists of a brick plus 73 porcelain rods coated with catalytic alumina and platinum alloy. This coating completely oxidizes combustibles even at temperatures well below their normal burning points and generates enough

waste heat to fire boilers and heat plant processes. Experiences in using the catalyst units in paint-drying ovens. (A7, L26)

248-A. Minerals: Better Get Smart or Go Broke. *Iron Age,* v. 169, June 26, 1952, p. 55-56.

Statistical report on the critical shortage of certain minerals in the U. S. Table of pertinent data includes estimated future trend of mineral consumption. (A4)

249-A. Alnico Recovery Process Salvages Valuable Nickel, Cobalt. Arant H. Sherman and Marvin Pesses. *Iron Age,* v. 170, July 3, 1952, p. 115-119.

A practical method for recovery of above waste metal grindings and skimmings in manufacture of permanent magnets. (A8, Ni, Co, Cu)

250-A. Outlook for Aluminum Industry Is Bright—Executive Predicts. David P. Reynolds. *Light Metal Age,* June 1952, p. 16, 24.

Anticipated production figures, and possible application of atomic power to Al production. (A4, Al)

251-A. The French Iron and Steel Industry. *Metal Bulletin,* June 13, 1952, p. 13-20.

Impressions of a recent visit to the Lorraine and Nord steel areas of France. (A4, D general, Fe, ST)

252-A. Government Price, Allocation Controls Seen Contributing Factors to Shortage of Copper. Whipple Jacobs. *Metals,* v. 22, June 1952, p. 7-8.

Predictions of president, Phelps Dodge Copper Products Corp. (A4, Cu)

253-A. Estimates Free World Annual Output of Nickel Will Increase 65 Per Cent Above Prewar Years. John F. Thompson. *Metals,* v. 22, June 1952, p. 9, 19.

Predictions of chairman, International Nickel Co. of Canada, Ltd. (A4, Ni)

254-A. Yugoslav Mining Expands With Metals Going to "Free World". P. J. Sergeant. *Mining World,* v. 14, July 1952, p. 32-35.

A personal tour and survey of major Yugoslavian mining areas confirms recent reports of rapid expansion and growing exports of nonferrous metals from this country. (A4, B10, EG-a)

255-A. Interview With Kaiser Aluminum's Bert Inch. *Modern Metals,* v. 8, June 1952, p. 29-30, 32.

Answers to pertinent questions concerning several specific aspects of the immediate and long-term outlook for Al. (A4, Al)

256-A. ALCOA Gears up for Big Peacetime Markets. I. W. Wilson. *Modern Metals,* v. 8, June 1952, p. 48-50, 52.

Alcoa's present and prospective position in the Al industry and what the future holds for Al. Details of Alcoa's expansion, how it is being financed, and what the major markets will be. Graphs. (A4, Al)

257-A. "Czar" Sam Anderson Discusses the Aluminum Supply Outlook. *Modern Metals,* v. 8, June 1952, p. 55-56, 58, 60-61.

Questions concerning the rise in civilian Al demand, long-term military requirements, further expansion of U. S. productive capacity, increased imports from Canada, and the impact of all these factors on the accumulation of an Al stockpile. Results of recent government-industry meetings. Graphs. (A4, Al)

258-A. Output of Copper in 1951, by Producers. David N. Skillings. *Skillings' Mining Review,* v. 41, July 12, 1952, p. 1-2. (A4, Cu)

259-A. (German.) **Purification of Gases by Bag Filters and Cyclone Separators.** Werner Sauermann. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 5, May 1952, p. 185-191.

Characteristics of bag filters, cyclone separators, and dust centrifuges. Industrial uses of specialized types. Diagrams. (A5)

260-A. Light Metals Face a Busy Future. Charles M. Craighead. *Battelle Technical Review,* v. 1, June 1952, p. 65-66.

Prospects for expanded use of Al and Mg and their alloys, as well as present and potential raw-material and power sources (the latter for reduction of Al_2O_3 to Al.) (A4, Al)

261-A. Engineering and Metallurgical Research by Babcock & Wilcox, Limited, at Renfrew. *Engineering,* v. 173, June 27, 1952, p. 797-801.

Research program of English company primarily concerned with boiler design but covering a wide variety of developments in design, measurement techniques, etc. (A9)

262-A. A Dictionary of Metallurgy. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging,* v. 19, May 1952, p. 217-224, June 1952, p. 265-272.

May issue covers "Brown & Sharpe Gauge" to "Celtium". June issue covers "Cement to Coarse Metals". (To be continued.) (A10)

263-A. Research and Development in the Mineral and Metal Industries. Robert F. Mehl. *Mines Magazine,* v. 42, June 1952, p. 39-41, 46, 50.

An address. (A9)

264-A. Point IV—Medieval Mining Frontiers Pushed Back. Alan Probert. *Mining Engineering,* v. 4, July 1952, p. 661-665.

Point Four mineral projects are wholly devoted to technical assistance in cooperation with other governments and have no direct responsibility for procurement. The objective of the program is to impart American skills and techniques directly to the peoples of industrially underdeveloped countries. Discusses mineral status of and progress in Brazil, Nepal, India, Mexico, Bolivia, and Colombia. Photographs. (A4, B10)

265-A. The General Organization of Technical and Scientific Societies in Great Britain and Switzerland. *Sheet Metal Industries,* v. 29, July 1952, p. 600-606.

A report of a joint technical conference held in Zurich recently. Only the Swiss societies are dealt with. Activities of a number of these are given briefly. (A9)

266-A. Instituto Sperimentale dei Metalli Leggeri: A Review of the Activities of the Institute During 1951. M. D. J. Brisby. *Sheet Metal Industries,* v. 29, July 1952, p. 607-608. (A9)

267-A. (Book). **A Bibliographical Survey of German and Japanese Experience in the Extraction of Low-Grade Non-Ferrous Ores and the Recovery of Non-Ferrous Metals and Compounds.** 100 pages. H. M. Stationery Office, York House, Kingsway, London W.C.2, England. (Dept. of Scientific and Industrial Research, Technical Information and Documentation Unit, Report RMS-3.) 90c.

Based on German and Japanese experience before and during the war. Mining and ore dressing, smelting and recovery of base metals. Production and recovery of nonferrous metals. The waste materials from which metals have been recovered include slags, scrap metals, waste liquors, flue dusts, and spent catalysts. Grinding dust, swarf, and even floor sweepings from engineering works can be treated for recovery of scarce metals. (A8, B general, EG-a)

268-A. (Book) **Elementary Metallurgy. Ed. 2.** Lee H. Johnson. 258 pages. McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y. $4.50.

Popular text designed to give the reader a better understanding of the metals with which he is specifically concerned. Stress has been placed on the origin of steel and the influence of carbon. Detail is included on the openhearth process and the blast-furnace process and the chapter on wrought iron contains a description of the Aston process. Recent metallurgical developments are included. (A general, D general, Fe, ST)

269-A. (Book) **Handbook of Engineering Fundamentals. Ed. 2.** Ovid W. Eshbach, editor. 914 pages. 1952. John Wiley & Sons, 601 W. 25th St., New York 18, N. Y. $10.00.

Mathematical and physical tables; mathematics; physical units and standards; mechanics of rigid bodies; mechanics of deformable bodies; mechanics of incompressible fluids; aerodynamics; engineering thermodynamics; electricity and magnetism; radiation, light, and acoustics; chemistry; metallic materials; nonmetallic materials; and engineering law. Replaces 1936 edition. (A general, U general)

270-A. (Book) **Red Metal; the Calumet and Hecla Story.** C. Harry Benedict. 257 pages. 1952. University of Michigan Press, Ann Arbor, Mich.

The story of the past linked to the present by the energies and fortunes of many men. Covers 85 years of American enterprise relating to the largest of the copper mines of the Michigan Upper Peninsula. (A4, B12)

271-A. (Book) **Practical Metallurgy for Engineers. Ed. 5.** 599 pages. E. F. Houghton Co., Philadelphia.

Latest metalworking standards and practices. Probabilities for the future relating to new metals, alloying elements, and types of heat treatment. Chapters added since the 1943 edition include one on flame and induction heating. New material on other surface-hardening methods. Other revisions incorporate latest AISI steel specifications. (A general, J general)

272-A. Australia in Relation to the Iron and Steel Industry. R. H. M. Rowe. *Australasian Engineer,* May 7, 1952, p. 50-54.

An address. Ore resources; main plants. (A4, B10, Fe, ST)

273-A. The Outlook for Key Commodities. *Chemical and Engineering News,* July 21, 1952, p. 2983-2986.

Third of four articles based on reports of the President's Materials Policy Commission. Ferrous and nonferrous metals, miscellaneous strategic materials and nonminerals. (A4)

274-A. The Crisis in Raw Materials. *Fortune,* v. 46, Aug. 1952, p. 114-117, 160, 163-164, 166-168, 170.

Condensed from a 5-volume report by the President's Materials Policy Commission. (A4)

275-A. South Africa Expands Steel Production. *Iron and Steel Engineer,* v. 29, July 1952, p. 135, 138.

The general status of steel production in South Africa, citing early phases of development. (A4, ST)

276-A. The Functions of the Government Metallurgical Laboratory. L. Taverner. *Journal of the Chemical Metallurgical and Mining Society of South Africa,* v. 52, Apr. 1952, p. 225-236; disc., p. 236-240.

Facilities and work of laboratory located in Johannesburg, South Africa. (A9)

277-A. United States Trade in Ores and Metals. *Metal Age,* July 1952, p. 3-10.

Text and tables. (A4)

278-A. Ion Exchange—a New Technique for Metallurgists. Bernard Ostrof and Ernest E. Thum. *Metal Progress,* v. 62, July 1952, p. 67-74.

Ion exchange in general. Applications for purification of H_2O and Cr electroplating solutions; recovery of Fe, Cr, Mn, Cu, Zn, and acid from pickling liquors; separation of rare earths; and purification of Zr from Hf. Diagrams and photographs. (A8, L17, L12, C26)

279-A. A New Research and Engineering Laboratory. R. W. Schlumpf. *Metal Progress,* v. 62, July 1952, p. 79-83.

Laboratory of Hughes Tool Co., Houston, Tex. (A9)

280-A. U. S. Annual Aluminum Supply of 4 Billion Pounds Seen From Primary Output, Scrap Intake, Imports. David P. Reynolds. *Metals,* v. 23, July 1952, p. 7-9.

Opinions of vice-president, Reynolds Metals Co. (A4, Al)

281-A. Gold Ore Production and Costs of 16 Canadian Firms in 1951. David N. Skillings. *Skillings Mining Review,* v. 41, July 19, 1952, p. 1-2.

Operations of each company briefly summarized. Data tabulated. (A4, Au)

282-A. (French.) Metallurgical Techniques Applied to Archaeology. Albert France-Lanord. *Revue de Métallurgie,* v. 49, June 1952, p. 411-422.

Includes sections on fabrication of ancient swords and on corrosion and conservation of ancient bronzes. Numerous illustrations. 18 ref. (A2, R general, ST, Cu)

283-A. (German.) Work of the Verein Deutscher Eisenhüttenleute in 1951. *Stahl und Eisen,* v. 72, June 19, 1952, p. 733-758.

Extensive review of organization and research of German iron and steel organization. 223 ref. (A9, Fe, ST)

284-A. Aluminium Limited: Little Brother Grows Up. *Business Week,* July 26, 1952, p. 82-84, 86-88, 90.

Deals with the economic status of Al in Canada, stressing the position and importance of Aluminium Limited of Montreal. (A4, Al)

285-A. Extinguishing Magnesium Fires With Boron Trichloride. *Foundry,* v. 80, Aug. 1952, p. 257-259.

Boron trichloride was found to be effective in extinguishing magnesium fires in heat treating, preheating and annealing furnaces. It is convenient to use because it vaporizes readily and is therefore easily applied. The chemical reaction involved which makes it a good extinguisher. (A7, J general, Mg)

286-A. A Recording Dust Meter. B. O. Smith and S. S. Carlisle. *Journal of the Iron and Steel Institute,* v. 171, July 1952, p. 273-276.

The instrument gives a continuous record which, generally, is a qualitative measure of the dust level. It uses a light-scattering technique in which a photo-electric cell measures the light scattered by dust particles in a direction normal to the illuminating beam. The scattered light flux, inferred from the photocell current, is taken as a measure of dust concentration. Results obtained in a series of trials on blast-furnace gas. Graphs, drawings, and circuit diagram. 11 ref. (A5)

287-A. Treatment of Copper Roaster Reverberatory Flue Dust. A. J. Kroha and J. A. Finley. *Mines Magazine,* v. 62, July 1952, p. 40-42, 58.

Experimental tests on extraction of Cu and Pb from flue dust. A sulfatizing roast followed by an acid leach extracted the Cu but the Pb was unaffected. Chloridized roasting followed by acid-brine leach gave excellent extraction of both Cu and Pb. Flotation tests showed high reagent consumption for cement Cu and sulfide Cu and necessitated an additional circuit for recovery of oxidized Cu and Pb. (A8, C21, Cu, Pb)

288-A. Resources for Freedom. *Mining World,* v. 14, Aug. 1952, p. 42-47.

A resumé of the President's Materials Policy Commission report. Evaluates metals and mineral uses and needs, estimates 1975 consumption, and recommends methods to prevent shortages. Special consideration is given to iron and ferro-alloys and to nonferrous metals. (A4)

289-A. Outside Facilities Extend Scope of Industry Research. Benjamin Melnitsky. *Steel,* v. 131, Aug. 4, 1952, p. 96-98.

How basic and applied research problems of many companies are being solved by universities, trade associations, and government agencies. Summary list outlines sources. (A9)

290-A. Wet Dust Recovery: Big Tonnage Returns. Martin L. Cover. *Steel,* v. 131, Aug. 11, 1952, p. 98, 101-102, 104, 106, 109.

How wet dust from blast furnaces is recovered in the form of sludge, made into filter cake, and recharged as sinter. Layout for wet flue-dust recovery plant. (A8, D1)

291-A. South African Iron and Steel Industrial Corporation Limited. *Steel Equipment & Maintenance News,* v. 5, July 1952, p. 6-8.

Equipment and facilities. (A5, ST)

292-A. Review of Iron and Steel Literature for 1951. V. S. Polansky. *Blast Furnace and Steel Plant,* v. 40, July 1952, p. 793-800.

35th annual review list. Concerned only with separately published books and pamphlets. (To be continued.) (A10, Fe, ST)

293-A. Metallurgical Activities at Frankford Arsenal. Daniel J. Murphy. *Metal Progress,* v. 62, Aug. 1952, p. 67-72.

Basic metallurgical research in mechanical metallurgy, structure of metals, and foundry. Process research in fabrication of metals, welding, corrosion and heat treatment. Special problems in brass and steel cartridge cases and armor-piercing shot. (A9, T2)

294-A. Westinghouse Electric Correlates Its Product Development With Research. John Parina, Jr. *Metal Progress,* v. 62, Aug. 1952, p. 73-78.

Development of magnetic materials, high-temperature alloys, investment castings, shell molding, mechanical properties. (A9)

295-A. Economy in Steel Alloying Elements; Guide to Alloy Steel Direction. *Metallurgia,* v. 46, July 1952, p. 31-32.

Guide to use of a new British government directive. (A4, AY)

296-A. Alcan's Aces: Cheap Hydro Power. *Steel,* v. 131, Aug. 18, 1952, p. 76-77.

Supplier of 1/4th of the world's aluminum taps Canada's abundant hydroelectric potential to feed power-hungry smelters at a cost that can't be matched in the U. S. (A4, C21, Al)

297-A. (Book) **Elementary Metallurgy.** Ed. 2. W. T. Frier. 258 pages. 1952. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. $4.50.

Somewhat enlarged by the incorporation of new developments within the field. A practical, easily understood analysis of elementary metallurgy. (A general)

298-A. (Book) **An Outline of Metallurgical Practice.** Ed. 3. Carle R. Hayward. 728 pages. 1952. D. Van Nostrand Co., 250 4th Ave., New York 3, N. Y. $10.00.

Essential facts about metallurgical practice from mine to finished product. Many sections are completely rewritten. New ones have been added to cover recent developments. Brief chapters added on titanium and uranium. The treatment of secondary metals reflects their increasing importance. More than 400 illustrations, about a third of which are entirely new. (A general)

299-A. (Book) **Statistical Year Book for 1951.** 119 pages. British Iron and Steel Federation, Steel House, Tothill St., London, S.W. 1, England. 7s, 6d.

Information concerning the iron and steel industry in the United Kingdom. Besides iron and steel production, finished steel deliveries, and the use of raw materials, the tables give details regarding imports and exports, prices, stocks, and employment in the industry. (A4, Fe, ST)

300-A. (Book—German.) **Metallkunde. 1. Aufbau der Metalle und Legierungen. II. Eigenschaften. Grundsätze der Form- und Zustandsgebung.** (Metallurgy. I. Structure of Metals and Alloys. II. Properties. Principles of Modification of Form and Structure.) Ed. 2. Heinz Borchers. 110 and 154 pages. 1950 and 1951. Walter de Gruyter & Co., Berlin 3, Germany. 2.40 DM per vol.

A digest-type account for the nonmetallurgist, of physical metallurgy for engineers. Vol. I: Crystalline structure and nature of single-phase and polyphase systems; the meaning of an equilibrium diagram; numerous examples of the diagrams of the commoner alloys. Vol. II: Physical properties and how these are affected by temperature, composition, etc. Casting, spraying, sintering of powder, heat treatment, forging, cutting, and machining. Illustrations and diagrams; indexes and bibliographies. (A general)

301-A. Metallurgy. H. A. Holden. *Chemical & Process Engineering,* v. 33, Aug. 1952, p. 431-434.

Reviews recent developments in Ti, Zr, and other new metals; chromizing; cold extrusion, and nondestructive testing. 105 ref.
(A general, L15, G5, S13, Ti, Zn)

302-A. Large Ingot Casting Speeds Heavy Press Program. *Light Metal Age,* v. 10, Aug. 1952, p. 17.

Development of 7000-lb. Al ingots by Kaiser Aluminum & Chemical Corp. will accelerate the Air Force's $389,000,000 heavy press program to mass-produce large aircraft parts. (A4, C5, Al)

303-A. South Korean Industrial Scrapbook. *Steel,* v. 131, Aug. 25, 1952, p. 74-75.

Some of the equipment and procedures of Korean metalworking plants, many of which are quite antiquated. (A4)

304-A. Is There a Real Structural Steel Shortage? *Architectural Forum,* v. 97, Aug. 1952, p. 112-115.

Questions and answers concerning supply and demand of structural steel, and basic economics involved. Graphs. (A4, CN)

305-A. Chemical and Metallurgical Problems Arising in the Development of Processes for the Release of Atomic Energy. J. P. Baxter. *Australasian Engineer,* July 7, 1952, p. 49-52.

Problems include supply and concentration of U, its extraction in high degree of purity, health hazards, and storage and disposal problems. (A general)

306-A. Alternative Materials. Murray C. Udy. *Battelle Technical Review,* v. 1, Aug. 1952, p. 84-88.

Various substitutes that may be used in place of certain strategic metals. Conserving Cu, alternatives for alloy steels, stainless steels, other conservation measures, plastics as alternative materials, and high-temperature materials. (A general)

307-A. Automatic Control Purifies Plating Wastes. *Canadian Metals,* v. 15, Aug. 1952, p. 18, 20.

Instrumentation for removal of soluble Cr products from plating wastes, at a plant which fabricates Cr-plated automotive parts.
(A8, L17)

308-A. The Development and Present Status of the Magnesium Industry. A. W. Winston. *Engineer Research and Development Laboratories* (Ft. Belvoir, Va.), "The Magnesium Symposium", Feb. 9, 1951, p. 1-6.

Includes tables and graphs.
(A4, Mg)

309-A. The Building of the Fairless Works. *Fortune,* v. 65, Sept. 1952, p. 90-94.

Picture story showing construction of U. S. Steel's Fairless Works, on the Delaware River near Morrisville, Pa. The furnaces and mills comprise an integrated operation from ore dock to finished sheet, tinplate, bar, and pipe.
(A5, D general, ST)

310-A. U. S. 1975 Demand for Copper, New and Old, May Rise to 2,500,000 Tons, up 45% From 1950 Level. *Metals,* v. 23, Aug. 1952, p. 7-9.

Excerpts from President's Materials Policy Commission report dealing with the Cu position in this country. (A4, Cu)

311-A. New Research and Development Department: The Swinden Laboratories, Rotherham. *Metal Treatment and Drop Forging,* v. 19, Aug. 1952, p. 343-346, 354.

New facilities and the wide range of research conducted at these laboratories. (A9)

312-A. A Survey of the Antimony Situation. E. F. Jeal. *South African Mining and Engineering Journal,* v. 63, Aug. 2, 1952, p. 951, 953.

Statistical report including uses and availability of South African Sb, production and sales, market factors, and information concerning Consolidated Murchison, the leading South African producer. Tables. (A4, Sb)

313-A. Strategic Elements: Emphasis Is on Conservation. J. G. Terry. *Steel,* v. 131, Sept. 1, 1952, p. 82-84.

Conservation of Ni, Cu, and Cb by substituting less strategic metals and alloys. (A general, Ni, Cu, Cb)

314-A. Cobalt: World Sources and Supplies. J. B. Richardson. *Times Review of Industry,* v. 6, July 1952, p. 24-25, 27.

Includes description of methods of recovery from the ore, and of smelting and refining.
(A4, B general, C21, Co)

315-A. What's Ahead in the West? *Western Metals,* v. 10, Aug. 1952, p. 49-51.

A brief economic survey of California's metalworking advances since Korean War. Future prospects. Tables. (A4)

316-A. (French.) Purification of Cupola Fumes. *Fonderie,* July 1952, p. 3027-3031.

Principal static and dynamic types of equipment for the above.
(A7, E10)

317-A. U. S. Mining Tomorrow. Demand for Minerals up 90% by 1975. *Engineering and Mining Journal,* v. 153, Sept. 1952, p. 90-93; disc., p. 93-95.

Brief indication of content of the five-volume Paley Report—of the

President's Materials Policy Commission. Current consumption and projected demand are graphed for important metals. (A4, B12)

318-A. Separation of Cryolite From Carbon Dust From Aluminium Reduction Furnaces. P. I. A. Narayanan and G. P. Mathur. *Journal of Scientific & Industrial Research,* v. 11A, July 1952, p. 310-312.

Four methods of separation and results. Tables. (A8, C21, Al)

319-A. (Book.) **Economics of American Manufacturing.** Edward L. Allen. 566 pages. 1952. Henry Holt & Co., New York. $6.95.

Study of 19 industries in five general categories—basic metals, basic nonmetalics, metalworking, textile and leather, and consumers' goods. (A4)

320-A. (Book.) **General Report, Iron and Steel Committee.** 106 pages. 1952. International Labor Office, 1825 Jefferson Place, N.W., Washington 6, D. C. $1.50.

Committee report of the Fourth Session, Geneva, 1952, of the International Labor Office surveys the steel industry on an international basis. Includes reports on supply and demand, modernization and development, and labor conditions. (A4, Fe, ST)

321-A. (Book.) **Michigan Copper and Boston Dollars.** William B. Gates, Jr. 301 pages. 1951. Harvard University Press, Cambridge, Mass.

An economic history of the Michigan copper mining industry. Emphasizes use of economic tools in approaching this type of history. Statistics, notes, bibliography, glossary and index. (A4, Cu)

322-A. (Pamphlet.) **Nuclear Science in Engineering Education; a Selected List of References for Instructors.** *Office of Technical Services, U. S. Atomic Energy Commission,* TID-3011, Aug. 22, 1951, 14 pages. 10c.

Reports of the U. S. Atomic Energy Commission and its contractors, the journal literature, textbooks, and reference books. The references are listed by title under general papers, elementary nuclear science, reactor theory, reactor technology, reactor construction materials, power from nuclear reactors, heat transfer, chemistry, separation processes, radiation detection and protection; radiological hazards, radioactive waste and chemical processing, and textbooks and reference tools. Includes indicative abstracts. (A10, S19)

323-A. (Book.) **The Story of the Mushets.** Fred M. Osborn. 190 pages. Thomas Nelson & Sons, Ltd., Parkside Works, Edinburgh 9, Scotland.

The story of David and his son Robert Forester Mushet who did much to advance metallurgy. Both men were remarkable for a tremendous volume of work on ferrous metallurgy but the latter is famous for two major discoveries: use of spiegeleisen in steelmaking and development of the first steel to be self or air hardening. (A2, B22, ST, TS)

324-A. Salvage Control in Aircraft Production. Willis L. Nye. *Aero Digest,* v. 65, Sept. 1952, p. 106-112.

A systematic method for the retrieval of waste parts or materials coupled with an educational program for personnel to stimulate interest in waste reduction. Flow sheets. (A8)

325-A. Applications of High Power Ultrasonics. E. A. Neppiras. *Industrial Chemist and Chemical Manufacturer,* v. 28, Sept. 1952, p. 408-413.

Applications include erosion of metal, dispersion of solids, emulsification, depolymerisation, biochemical and bactericidal effects, chemical activation, and in metallurgy: emulsifying immiscible metals, prevention of supercooling, degassing, and precipitation. (A general)

326-A. The Ignition of Inflammable Gases by Sparks From Aluminium Paint and Rusty Steel. F. E. T. Kingman, E. H. Coleman, and Z. W. Rogowski. *Journal of Applied Chemistry,* v. 2, Aug. 1952, p. 449-456.

Tables and photographs. (A7, L26)

327-A. Build-Up in Steel. *Steel,* v. 131, Sept. 22, 1952, p. 146-148, 150, 152.

Capacity statistics of the nation's steel producers as of July 1, 1952 and as expected Jan. 1, 1953 for openhearth, bessemer, and electric. Capacity figures for coal chemical recovery ovens. (A4)

328-A. Summarized Proceedings of the Fourth Industrial Physics Conference—Glasgow, June 1952. *British Journal of Applied Physics,* v. 3, Sept. 1952, p. 273-277.

Topics discussed at the conference included: "Physics in the Service of Metallurgy", "Meteorology in Industry", "Physics and Sound Reproduction", and "Noise and Its Suppression". (A general)

329-A. Ion Exchangers Solve Waste Disposal Problem. A. C. Reents and D. M. Stromquist. *Chemical Engineering,* v. 59, Sept. 1952, p. 336, 338-339.

Two examples of using ion exchange resins for recovering toxic and valuable chromates from rinse waters. Diagram. (A8, Cr)

330-A. Steel Shortage Emphasizes Value of Salvage by Reconditioning Steel Drums. E. G. Silven. *Industrial Gas,* v. 31, Sept. 1952, p. 8-9.
Describes reconditioning process at Acorn Cooperage, Providence, R. I. (A8, ST)

331-A. How Weirton Steel Guards Against Fire. E. T. Davis. *Iron Age,* v. 170, Sept. 25, 1952, p. 113-116.
Extensive use of built-in fire fighting systems teamed with portable extinguishers and two fire departments. Special classes to train some 300 men a year in use of fire extinguishers. Daily inspection. Special precautions before welding. (A7)

332-A. Sale of Uranium Contaminated Steel Scrap Recommended. Hanson Blatz. *Iron Age,* v. 170, Sept. 25, 1952, p. 125-127.
Recommended by a division of Atomic Energy Commission. A study indicates use of the scrap will not affect personal health or the steel product made from the contaminated scrap. (A8, A7, ST)

333-A. Nonferrous Metals Engineer Faces Challenge After Century of Progress. R. W. Diamond and B. P. Sutherland. *Journal of Metals,* v. 4, Oct. 1952, p. 1033-1035.
Historical survey of discovery and extraction of Cu, Ni, and Al in particular. Future trends for Ti and U. (A2, Cu, Ni, Al, Ti, U)

334-A. Recovery of Nickel & Zinc From Silver Refinery Waste Liquor. Part II. Chemical Methods. R. K. Dutta and T. Banerjee. *Journal of Scientific & Industrial Research,* v. 11B, Aug. 1952, p. 342-343.
(A8, Ni, Zn, Ag)

335-A. Hindsight on the Copper Market. *Metal Age,* Sept. 1952, p. 3-4.
Includes an extensive tabular supplement on the copper market: 1949-1952. (A4, Cu)

336-A. French Aluminium Industry. Maurice Moyal. *Metal Industry,* v. 81, Sept. 5, 1952, p. 191-193.
Economic survey. Tables. (A4, Al)

337-A. 1975 New Copper Demand in Free World Outside U. S. Put at 2 Million Tons, Up 50% From 1950. Part II. *Metals,* v. 23, Sept. 1952, p. 7-9.
Excerpt from Materials Policy Commission's report "Resources for Freedom". (A4, Cu)

338-A. The Secondary Aluminum Industry in the U. S. A. *Modern Metals,* v. 8, Sept. 1952, p. 52-54, 56.
Digest of a report by a group of European technical observers based on a United States tour. General nature of secondary industry, processing of scrap into ingot, casting processes, wrought products, applications, alloys, and control of production and research. Diagrams. (To be continued.) (A8, Al)

339-A. Metal Recovery by Ion Exchange. T. J. Fadgen. *Sewage and Industrial Wastes,* v. 24, Sept. 1952, p. 1101-1107.
Laboratory study to obtain information on size of equipment, operating costs, and potential accomplishment. Examples for treating three rinse waters: chromic acid, nickel, and acid copper. Relation to stream pollution and water conservation. (A8, Cr, Ni, Cu)

340-A. Waste Disposal at the Fontana Steel Plant. H. I. Riegel. *Sewage and Industrial Wastes,* v. 24, Sept. 1952, p. 1121-1129.
Water conservation and pollution control procedures at Fontana, Calif., plant of Kaiser Steel Corp. which is located in a water-scarce area. (A8, D general)

341-A. Steel: What Will the Industry's Future Be? W. V. Packard. *Iron Age,* v. 170, Oct. 9, 1952, p. 193-195.
Brief discussion. Tables. (A4, ST)

342-A. The Road Ahead. *Iron Age,* v. 170, Oct. 9, 1952, p. 292-294, 296-298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 326. (Based on "Resources for Freedom", the President's Materials Policy Commission Report, Vol. I.)
General economic survey covering our raw material resources: consumption, present and anticipated status; need for conservation; etc. (A4)

343-A. General Outlook for Metals. E. L. Shaner. *Journal of the American Zinc Institute,* v. 30, 1952, p. 21-29.
Brief economic analysis. (A4)

344-A. The Future of Zinc Ore Production in the United States—Eastern District. William Black. *Journal of the American Zinc Institute,* v. 30, 1952, p. 52-53.
(A4, B10, Zn)

345-A. A Quick Review of the Zinc Mine Production and Particular Developments in the Mid-Central States. O. W. Bilharz. *Journal of the American Zinc Institute,* v. 30, 1952, p. 54-57.
(A4, B10, Zn)

346-A. Estimated Zinc Production in Colorado, New Mexico, Arizona, and Utah—1952. W. C. Page. *Journal of the American Zinc Institute,* v. 30, 1952, p. 57-62.
(A4, B10, Zn)

347-A. The Future of Zinc Ore Production and Development in Nevada and California. S. S. Arentz. *Journal of the American Zinc Institute,* v. 30, 1952, p. 62-68.
Surveys the above. (A4, B10, Zn)

348-A. Outlook for Zinc Production in Idaho and Washington. J. E. Berg.

Journal of the American Zinc Institute, v. 30, 1952. p. 68-73.
(A4, B10, Zn)

349-A. Zinc Resources of Butte and Montana. F. A. Linforth. *Journal of the American Zinc Institute,* v. 30, 1952, p. 73-83.
(A4, B10, Zn)

350-A. Outlook for Brass. William M. Goss. *Journal of the American Zinc Institute,* v. 30, 1952, p. 87-94.
Economic prospects with special reference to use of Zn in brass.
(A4, Cu, Zn)

351-A. World Zinc Situation. S. D. Strauss. *Journal of the American Zinc Institute,* v. 30, 1952, p. 94-105.
A survey. Graphs and table.
(A4, Zn)

352-A. Zinc Resources and Development in Canada. F. Lloyd Hallam. *Journal of the American Zinc Institute,* v. 30, 1952, p. 106-114.
(A4, B10, Zn)

353-A. Zinc Resources and Development in Africa. Francis Cameron. *Journal of the American Zinc Institute,* v. 30, 1952, p. 115-120.
(A4, B10, Zn)

354-A. Aluminium Fabrication. *Metal Industry,* v. 81, Sept. 19, 1952, p. 223-226.
Account of a visit to the Northern Aluminium Co.'s Banbury Works (England) in which the departments of remelt, sheet mill, heat treatment, extrusion, quality control, and laboratories are described. (A5, Al)

355-A. Historical Aspects of and Conservation in Constructional Alloy Steels. John Mitchell. *Metal Progress,* v. 62, Oct. 1952, p. 97-103, 144.
Past and present conservation of critical materials (Ni, Cr, Mo, Mg) in alloy steel. Future requirements. Graphical information. (A4, AY)

356-A. The Marshall Plan and French Mining. Maurice Moyal. *Mining Magazine,* v. 88, July 1952, p. 9-15; Aug. 1952, p. 86-89.
Reviews France's industrial revival, as well as the effect of ECA aid for exploration. Aug. issue deals with French overseas territories.
(A6, B12)

357-A. A Dictionary of Metallurgy. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging,* v. 19, July 1952, p. 319-326; Aug. 1952, p. 355-362; Sept. 1952, p. 391-398.
July issue: "Cobalt" to "corronizing." Aug. issue: "Corrosion" to "cuttlefish process." Sept. issue: "Cyanide hardening" to "Diorite." (To be continued). (A10)

358-A. Disposal of Plating Room Wastes. IV. Batch Volatilization of Hydrogen Cyanide From Aqueous Solutions of Cyanides. Barnett F. Dodge and Walter Zabban. *Plating,* v. 39, Oct. 1952, p. 1133-1139.
Some results from small-scale laboratory experiments on batch volatilization of HCN gas, dealing mainly with effect of most important rate-controlling variables. Graphs and tables. (To be continued.)
(A8, L17)

359-A. The World Metal Position. A. F. Dunbar. *Plating Notes,* v. 4, June 1952, p. 68-73.
Brief economic survey with some information on ore deposits.
(A4, B10)

360-A. Ion Exchange. New Hope for Waste Recovery. Allen G. Gray. *Steel,* v. 131, Oct. 20, 1952, p. 96-100.
Treatment of phosphoric acid pickling solutions, Cr plating baths, and Cu stripping baths.
(A8, L12, L17, Cr, Cu)

361-A. (Book.) **Directory of Indian Mines & Metals.** P. K. Ghosh. 208 pages. Mining, Geological & Metallurgical Institute of India. Rs. 15. 27 Chowringhee Rd., Calcutta 13, India.
Includes price lists and grade analyses. Trend of mineral industry in India; all mined materials are dealt with. Future trends, working methods, surface plant installations, administration, working conditions, health and safety.
(A10, B12)

362-A. (Book.) **Government-Owned Inventions for Free Use.** 104 pages. Government Patents Board, U. S. Dept. of Commerce. (Supt. of Documents, Washington). $1.00.
Lists 2339 patents available free to manufacturers, covering a broad range of fields including metallurgical. Indexed by industry group.
(A10)

363-A. (Book.) **Industrial Waste Treatment.** Edmund B. Besselievre. 391 pages. 1952. McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y.
Factors that enter into a waste problem and general principles of treatment. Specific information for a variety of wastes including pickling liquors and plating wastes. Chapter bibliographies.
(A8, L12, L17)

364-A. (Book.) **Metallurgical Engineering Principles.** Reinhardt Schuhmann, Jr. 390 pages. 1952. Addison Wesley Press, Inc., Cambridge 42, Mass. $6.50.
Engineering principles common to all unit processes in ten chapters: The unit process of chemical metallurgy; stoichiometry; the heat balance; metallurgical fuels; combustion of fuels and heat utilization; fluid flow; steady heat flow; un-

steady heat flow; phases in pyrometallurgical systems; and refractory materials. Each chapter is followed by a series of problems. (A general, P general)

365-A. (Pamphlet.) **Quarterly Bulletin of Steel Statistics for Europe.** Steel Section, Economic Commission for Europe, Geneva, Switzerland.

Tabular data arranged by countries. Text is in both English and French. (A4, ST)

366-A. Tin Conservation. Morris R. Machol. *Journal of the American Society of Naval Engineers,* v. 64, Aug. 1952, p. 459-474.

Suggestions include reducing thickness of babbitt in bearings, changes in design of bearing shape and methods of bonding, substituting babbitt metals with smaller Sn content, i.e. Pb base instead of Sn base, reducing percentages of Sn in solder, and specifying bronze compositions of smaller Sn content where physical or corrosion resistant characteristics will permit. Diagrams. (A4, Sn)

367-A. The Industry in the World Today. *Light Metals,* v. 15, Sept. 1952, p. 302-303; Oct. 1952, p. 336-337.

Surveys the Al industry in India. (A4, Al)

368-A. Materials Engineering Department at Westinghouse Develops, Improves, and Applies Materials. T. C. Du Mond. *Materials & Methods,* v. 35, Apr. 1952, p. 87-90.

Basic objectives and philosophies of above group, including organization chart and description of typical jobs and facilities. (A9)

369-A. Iron and Steel. A. M. Sage, J. Pearson, and J. C. Hudson. *Reports on the Progress of Applied Chemistry,* v. 36, 1951, p. 233-263.

Review on progress in the iron and steel field in 1951. Material for special purposes, constructional and engineering steels, surface treatments, physical metallurgy and methods of examining metal, chemical analysis, fundamental process chemistry, and corrosion. Numerous references. (A general, Fe, ST)

370-A. Non-Ferrous Metals: Physical Metallurgy. D. W. Wakeman. *Reports on the Progress of Applied Chemistry,* v. 36, 1951, p. 264-277.

Review of progress in 1951. Mechanical properties, constitution, solid state reactions, thermodynamics, precipitation hardening, melting and casting, corrosion and protection, and notes on wrought metals. Numerous references. (A general, EG-a)

371-A. Wyman-Gordon Co. Leader in Aircraft Forging. Part I. North Grafton Heavy Press Plant. Part II. The Worcester Plant. John C. McComb. *Steel Processing,* v. 38, Sept. 1952, p. 435-455; Oct. 1952, p. 510-512.

Highly illustrated plant description. (A5, F22)

372-A. New Frontiers in Massachusetts. John Pfeiffer. *Steelways,* v. 8, Sept. 1952, p. 8-11.

Metallurgical laboratory at Massachusetts Institute of Technology. (A3, A9)

373-A. Making the Foundry Safe for Top Production. Stanley C. Herbine. *Foundry,* v. 80, Nov. 1952, p. 120-123, 277-279.

Foundry hazards, particularly those affecting eyes. How some companies have successfully implanted safety consciousness among workers and thereby reduced accidents. (A7, E general)

374-A. Ion Exchange. Does It Have a Role in the Mineral Industry? Nathaniel Arbiter. *Engineering and Mining Journal,* v. 153, Nov. 1952, p. 80-85.

Mechanism of process with applications to water softening, deionization, food-product treatment, pharmaceuticals, and metal recovery from wastes. The latter includes recovery of $CuSO_4$ from copper wastes; purification and recovery of Cr in plating; and metal treating and purification of H_3PO_4 used in pickling baths. (A8, L12, L17, Cu, Cr)

375-A. Condensed Review of Some Recently Developed Materials Arranged Alphabetically by Trade Names. *Machinery* (American), v. 59, Nov. 1952, p. 161-178.

Extensive table consisting of type of material, trade name, properties, and applications. Includes such varied types as plastics, polishing compounds, coatings, new alloys, cutting oils, rust inhibitors, lubricants, wetting agents, welding and brazing rods, and many others. (A10)

376-A. German Light Metal Fabricating Industry. *Metal Industry,* v. 81, Oct. 31, 1952, p. 347-348. (Based on article in *Metall,* Oct. 1952.)

Position of German Al industry with respect to industrial equipment, demand, exports, and competition with steel. (A4, Al)

377-A. Cooperative Research Activities: The British Iron and Steel Research Association. (Anon.) **The British Welding Research Association.** K. Winterton. *Metallurgia,* v. 46, Oct. 1952, p. 179-185.

Brief account of work at these research organizations. (A9, K general, Fe, ST)

378-A. A Dictionary of Metallurgy. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging,* v. 19, Oct. 1952, p. 445-452.

Oct. issue includes terms "Dioxan" to "Elastic Limit". (To be continued.) (A10)

379-A. Disposal of Plating Room Wastes. IV. Batch Volatilization of Hydrogen Cyanide From Aqueous Solutions of Cyanides. (Concluded.) Barnett F. Dodge and Walter Zabban. *Plating,* v. 39, Nov. 1952, p. 1235-1244.

Study of evolution of HCN from aerated and agitated solutions. Appendix describes calculation of rate-of-volatilization constant for HCN and over-all stripping coefficient for batch volatilization of HCN from acidified cyanide solutions. Addendum describes use for design purposes of the empirical correlation for stripping of cyanide by aeration. Data are charted, tabulated, and discussed. (A8, L17)

380-A. Foreign Machine Tools. Ralph M. Kovel and Tell Berna. *Steel,* v. 131, Nov. 17, 1952, p. 92-94, 104, 107.

Companion articles debate economic problem posed by imports of foreign machine tools. Kovel believes that these imports answer a present need. Berna believes that they are a threat to our security. (A4, G17)

381-A. (Book.) **Laboratory Design for Handling Radioactive Materials.** 140 pages. 1952. National Academy of Sciences, Washington, D. C. (Building Research Advisory Board, Research Conf. Rept. 3)

Laboratory layout; air supply and exhaust; control and shielding of isotopes; surfaces and finishes; and disposal of radioactive wastes. Includes data on corrosion, susceptibility to contamination, and decontamination for a variety of surfaces: glass, organic, Al, Pb, stainless and structural steel, etc. Tables, photographs, and diagrams. Bibliography. (A9, P13, R general, Al, Pb, SS, ST)

382-A. (Book.) **Physical Metallurgy for Engineers.** D. S. Clark and W. R. Varney. 116 pages. D. Van Nostrand Co., 250 Fourth Ave., New York 3, N. Y. $6.50.

Subjects normally handled in texts on metallurgy for engineering students. The book is considerably more complete in development of subject matter than the usual text. (From review in *Iron Age.*) (A general)

383-A. (Book.) **Resources for Freedom. Vol. I. Foundations for Growth and Security. Vol. II. The Outlook for Key Commodities. Vol. III. The Outlook for Energy Sources. Vol. IV. The Promise of Technology. Vol. V. Selected Reports to the Commission.** 184, 210, 43, 228, and 154 pages. June 1952. Superintendent of Documents, U. S. Government Printing Office, Washington, D. C.

Report of President's Materials Policy Commission. First volume presents a summary and analysis of materials problem and recommendations of the Commission for its solution. In Vol. 2 and 3 studies on specific materials and energy resources are presented. Fourth volume reviews opportunities for technology to help resolve some of the more troublesome problems; the fifth presents a few of the basic studies prepared to assist the Commission in its deliberations. (A general)

SECTION B

RAW MATERIALS and ORE PREPARATION

1-B. Arches of High Rise Designed for Stability. J. D. Keller and J. Spotts McDowell. *Blast Furnace and Steel Plant,* v. 39, Nov. 1951, p. 1358-1370, 1399.

Design details for refractory roofs of industrial furnaces. Includes graphs and tabular data on thermal properties of various types of refractory brick. (B19)

2-B. Heavy-Media Separation of Northern Alabama Iron Ores. J. B. Baker. *Mining Congress Journal,* v. 37, Nov. 1951, p. 45-48.

Commercial development. (B14, Fe)

3-B. Incorporating Scrap in Ore Smelting Processes. C. C. Downie. *Mining Journal,* v. 237, Oct. 5, 1951, p. 338-339.

Methods adopted by large refineries with regard to the incorporation of nonferrous waste materials in the regular ore charges. (B22, A8)

4-B. New Shaft and Concentrator at International Nickel. *Mining Magazine,* v. 85, Oct. 1951, p. 210-211.

Procedure by which the ore is carried from the mine through crushing and grinding operations. (B12, B13. Ni)

5-B. Nickel Slags. C. C. Downie. *Mining Magazine,* v. 85, Oct. 1951, p. 212-214.

Properties, treatment, and utilization. (B21, Ni)

6-B. International Nickel Co.'s New Creighton Mill and 13th Shaft Now in Operation. *Mining World,* v. 13, Nov. 1951, p. 38-39.

Features of new shaft and a new concentrator. (B14, Ni)

7-B. "Sweat, Ingenuity, Dollars"—A New Mine for Howe Sound. *Mining World,* v. 13, Nov. 1951, p. 40-43.

How the Calera Mining Co. has carved a cobalt and copper producer from Idaho's Salmon National Forest. Procedures in recovery of the metals. (B12, Co, Cu)

8-B. New Rotary Unit Cools Sinter Economically. F. R. Greyson. *Steel,* v. 129, Nov. 19, 1951, p. 98, 101.

Novel method, which cools by ordinary atmospheric conditions without the aid of water or blowers, eliminates disintegration and breakage of the sintered iron ore used in blast furnaces. (B16, Fe)

9-B. Sylvester Process Extracts Manganese From Slag. George R. Sylvester. *Steel,* v. 129, Nov. 26, 1951, p. 84-85.

Includes flowsheet of concentration process. (B14, A8, Mn)

10-B. Ore: Humboldt Process Step by Step. W. G. Patton. *Iron Age,* v. 168, Dec. 6, 1951, p. 115.

A process for the beneficiation of a low-grade, non-magnetic iron-bearing ore, of the specular hematitic variety. (B14, Fe)

11-B. Sintering and Nodulizing Plant of Oliver Iron at Virginia, Minn. *Skillings Mining Review,* v. 40, Dec. 8, 1951, p. 1.

Processes and plant operation. (B16, Fe)

12-B. Greenside Mine; Mining and Milling Practice. (Concluded.) C. Connor. *Mine & Quarry Engineering,* v. 17, Dec. 1951, p. 387-390.

Grinding and flotation practices in the recovery of Pb at the Greenside Mine. Flow sheet. (B13, B14, Pb)

13-B. Triumph Mill—Full Production. *Mining World,* v. 13, Dec. 1951, p. 22-26.

Practices carried on at the Triumph Mining Co. at Triumph, Idaho, in the recovery of Au, Ag, Pb and Zn. Crushing and flotation operations. (B13, B14, Au, Ag, Pb, Zn)

14-B. Ashio Recovers Copper by HMS. *Mining World,* v. 13, Dec. 1951, p. 27-28.

A heavy-media-separation plant in Japan. Operations in the recovery of Cu. (B14, Cu)

15-B. Basic Laboratory Studies in the Unit Operation of Crushing. J. W. Axelson, J. T. Adams, Jr., J. F. Johnson, J. N. S. Kwong, and E. L. Piret. *Mining Engineering,* v. 3, Dec. 1951, *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 190, 1951, p. 1051-1069.

Basic investigations of crushing were concerned mainly with three phases of the problem: mechanism of the fracture process itself, particle-size distribution of the crushed product, and relationship between energy input and amount of new surface produced. 55 ref. (B13)

16-B. Five Variable Flotation Tests Using Factorial Design. Adrian C. Dorenfeld. *Mining Engineering,* v. 3, Dec. 1951, *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 190, 1951, p. 1073-1080.

Factorial design is a mathematical method of drawing valid conclusions from a series of tests made in a predetermined pattern. It is applied to flotation ore testing using, in this case, five variables, each varied twice, requiring a total of 32 tests. Representative conclusions were checked by repeat testing. 19 ref. (B14)

17-B. Katanga's Mineral Empire Based on Many Metals. Edgar B. Sengier. *Engineering and Mining Journal,* v. 152, Nov. 1951, p. 86-89; Dec. 1951, p. 92-96.

Central African enterprise which yields Cu, Zn, Co, Cd, Au, and Ag. Operations comprise open-pit and underground mining, concentration, smelting, and electrowinning. November installment: The deposits and mining procedures, and production and labor-productivity data. December: Facilities for gravity concentration and flotation, smelting, leaching and electrolytic work. (B10, B12, B14, Cu, Zn, Co, Cd, Au, Ag)

18-B. Heavy-Media Separation Recovers Limestone From Zinc. Walter B. Lenhart. *Rock Products,* v. 54, Nov. 1951, p. 64-71.

Process called HMS consists of placing minus-2-in. rock in a heavy fluid mixture, the density of which is easily and closely controlled. In this fluid, the lighter rocks float and the heavier ones sink thereby affecting a separation. Application of the process to Zn recovery. Flowsheets. (B14, Zn)

19-B. Recovery of Vanadium From Titaniferous Magnetite. Sandford S. Cole and John S. Breitenstein. *Journal of Metals,* v. 3, Dec. 1951, *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1133-1137.

Recovery of over 80% of the vanadium values in titaniferous magnetite from MacIntyre Development, Tahawus, N. Y., was accomplished by an oxidizing roast with Na_2CO_3-NaCl addition. Process for leaching of roasted ore and precipitation of V_2O_5 and Cr_2O_3 from leach liquor. 20 ref. (B14, B15, V)

20-B. Low Grade Bauxites and Clays as Potential Aluminum Resources. K. K. Kershner, C. W. Funk, and W. A. Calhoun. *Journal of Metals,* v. 3, Dec. 1951, *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1138-1142.

Future resources of aluminum may require the utilization of low-grade ores. Aluminum minerals such as clay, shale, and high-iron laterites may become important sources. An evaluation of reserves. New laboratory results on the Vereinigte desilication process. 22 ref. (B10, Al)

21-B. Experiences With Chromite Hearths in Electric Furnaces. Alexander L. Field. *Journal of Metals,* v. 3, Dec. 1951, p. 1123-1125.

Reviews work from 1912 to date. (B19)

22-B. The Production of High Temperatures in Industry by Town Gas. R. F. Hayman. *Gas World,* v. 134, Dec. 1, 1951, p. 495-504.

Problems associated with furnace design and use of modern refractory materials. Studies of flow patterns have shown that attention to the design of combustion chambers could do much to improve the performance of combustion chambers and improve the performance of existing plants. (B18)

23-B. Exploration and Development of Canadian Uranium Deposits. B. S. W. Buffam, and E. B. Gillanders. *Mining Journal,* v. 237, Nov. 16, 1951, p. 492-495.

Detailed Geiger surveys, diamond drilling, underground development, sampling and metallurgical tests, and operating costs. (B10, B11, B12, U)

24-B. Crystallization of Aluminum Chloride in the Hydrochloric Acid Process for Production of Alumina From Clay. Lewis Jesse Clark, Willard D. Hubbard, and James I. Hoffman. *Journal of Research of the National Bureau of Standards,* v. 47, Oct. 1951, p. 269-271.

When roasted clay is treated with dilute HCl, a solution is obtained that contains Al and other soluble constituents of the clay in the form

of chlorides. Crystallization as the hydrated chloride, $AlCl_3 6H_2O$, serves to separate the Al from the other soluble chlorides. A process is described for this crystallization on a large scale. (B14, Al)

25-B. Production of Iron Sinter at Helen Mine. K. O. Cockburn. *Canadian Mining and Metallurgical Bulletin,* v. 44, Nov. 1951, p. 745-753, disc., p. 753-754; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 54, 1951, p. 475-483; disc., p. 483-484.

Part I: Equipment and practice. Part II: Principles and theory of sintering practice as borne out by experience at the Helen plant. (B16, Fe)

26-B. Iron Ore; World Demand and Resources. T. P. Colclough. *Iron and Steel,* v. 24, Nov. 1951, p. 507-508. (A condensation).

A survey. Production data are tabulated. (B10, A4, Fe)

27-B. World Metal Shortages and Resources. *Metal Treatment and Drop Forging,* v. 18, Nov. 1951, p. 515-519; Disc., p. 519.

A summary of several papers sponsored by the Institute of Metals on Oct. 17 in London. Topics include nonferrous metals, substitute alloys, secondary light metals and secondary heavy metals. (B10, A4)

28-B. Diamond Recovery From Grinding Wheel Sludge. R. G. Weavind and R. S. Young. *Metal Industry,* v. 79, Nov. 23, 1951, p. 440.

Recovery is carried out by treatment with aqua regia and fusion with potassium hydroxide, followed by skin flotation of the diamonds in an acid bichromate solution. The procedure is simple, and both the reagents and equipment are inexpensive. (B13, A8)

29-B. The First Gold From the Free State Field. A Description of the St. Helena Reduction Plant. *South African Mining and Engineering Journal,* v. 62, Pt. 2, Oct. 27, 1951, p. 341, 343, 345, 347, 349, 351, 353.

Features of the plant. (B14, Au)

30-B. Large "Arbed" Primary Crushers. (In French.) *L'Ossature Métallique,* v. 16, Nov. 1951, p. 516-522.

Development, construction, and operation of Arbed jaw and rotary crushers. (B13)

31-B. New Developments in the Band-Sintering Process. (In German.) Helmut Wendeborn. *Stahl und Eisen,* v. 71, Nov. 8, 1951, p. 1212-1218.

Equipment and procedures for sintering of fine iron ores. A round sintering machine which sinters in two layers. Output is increased by lime addition. Oxidation phenomena. 17 ref. (B16, Fe)

32-B. Sintering of Iron Ores. (In Polish.) **Part I. Theoretical Basis of the Sintering Process.** W. Madej and B. Sewerynski. **Part II. Effect of Increased Vacuum on the Sintering Process.** S. Holewinski, W. Madej, and B. Sewerynski. *Prace Glownego Instytutu Metalurgii,* v. 3, no. 5, 1951, p. 351-374.

Part I: Important factors such as grain size, agglomeration and compactibility were investigated. The problem of porosity and strength of sinters. A method of calculating sintering efficiency. Part II: The effect of vacuum on sintering time of different ores, as well as effects of various additions. Vacuum of about 1200 mm. H_2O was found best in most cases. (B16, Fe)

33-B. Concerning Certain Micaceous Magnesium-Iron Ores. (In Russian.) D. P. Serdirchenko. *Zapiski Vsesoyuznogo Mineralogicheskogo Obshchestva,* ser. 2, v. 80, no. 3, 1951, p. 175-181.

Micaceous ores of the North Caucasus and Eastern Timan were investigated for contents and modes of occurrence of Fe, Mg, Li, Al, Si, K, etc. 21 ref. (B10, Fe, Mg, Li, Al)

34-B. (Book) **The Formation of Mineral Deposits.** Alan M. Bateman. 371 pages. 1951. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $5.50.

Materials involved, theories concerning origin of deposits, relation to igneous activity, primary mineralizing solutions, formation processes, exploration and exploitation of deposits, distribution and conservation of resources, and future outlook. (B10)

35-B. (Book) **Lazarus Ercker's Treatise on Ores and Assaying.** Translated from the German edition of 1580 by Anneliese Grundhaldt Sisco and Cyril Stanley Smith. 360 pages. 41 wood cuts. 1951. University of Chicago Press, Chicago 37, Ill. $10.

Ercker's 1574 book, with early translations into English and Dutch, was the standard book on fire assaying of gold, silver, lead and copper for at least 200 years. (Much of the book is also devoted to the smelting operations, controlled by the assayer's determinations.) Written at a time when alchemical balderdash was in high repute, Ercker's book is precise, factual, accurate, and thoroughly understandable to metallurgists of 1950. Many of his methods are in use today; in fact they are so accurate that the old-time assayers (and smeltermen) believed in the conservation of matter long, long before the idea was formulated as a law by scientists. The translation is most readable and

the commentary felicitous. Not only are Mrs. Sisco and Dr. Smith to be complimented, but also the University of Chicago Press for an extremely satisfying volume. E.E.T. (B15, S11)

36-B. (Book) **Basic Refractories.** J. R. Rait. 408 pages. Interscience Publishers, Inc., 250 Fifth Ave., New York 1, N. Y. $10.00.

Raw materials used in the production of basic refractories. The processing and components of basic refractories, followed by a review of available phase-equilibrium data. The performance of basic refractories in open-hearth furnaces, Heroult basic electric furnaces, mixer furnace linings, etc. Bibliography, author and subject index. (B19, D general)

37-B. (Book) **Wärmetechnische Rechnungen für Industrieöfen (Thermal Calculations for Industrial Furnaces).** Ed. 3. Werner Heiligenstaedt, 488 pages. Verlag Stahleisen, Düsseldorf. 44 O.M. (about $10).

Emphasizes fuel economy and how to attain it. Electrically heated furnaces are not included. The calculations are almost entirely restricted to fuels available in Germany. Nature of heat, calorific value of fuels, combustion, heat content of products of combustion, efficiency of heat utilization, fuel saving by preheating. Detailed steps in the production of steel, cast iron, malleable iron, alumina, copper, nickel, aluminum, magnesium, bricks, earthenware, glass, cement, and various chemical substances. Heat calculations and special problems. Heating capacity and fuel economy of batch-type, continuous, openhearth and reverberatory furnaces; furnaces for heating aluminum or magnesium, pit furnaces, shaft furnaces, blast furnaces, etc. Includes the Krupp process for making sponge iron. Bibliography almost entirely limited to German authors and investigators. The technical contents of the book deserve admiration and praise, but some fault must be found with the method of presentation—particularly large use of symbols without explanation.—W. Trinks. (B18, C general, D general)

38-B. Lithium and Its Compounds; A Staff-Industry Collaboration Report. Rodney N. Hader, Richard L. Nielsen, and Myron G. Herre. *Industrial and Engineering Chemistry,* v. 43, Dec. 1951, p. 2636-2646.

History and occurrence; derivation of Li_2CO_3 and other Li products from spodumene ores. Future plans. 26 ref. (B general, Li)

39-B. Raw Material Availability. A. C. Byrns and Fred Lohse. *Industrial and Engineering Chemistry,* v. 63, Dec. 1951, p. 2650-2656.

Petroleum and natural gas, coal, sulfur, inorganic salts, metallic ores, minerals, forest, and agricultural products in the West. (B10)

40-B. The Production of High Temperatures in Industry by Town Gas. R. F. Hayman. *Gas Times,* v. 69, Nov. 30, 1951, p. 319-321, 324.

Previously abstracted from *Gas World.* See item 22-B, 1952. (B18)

41-B. Size Reduction: Comminution Theories, Recent Research, Design Improvements, Special Techniques. R. V. Riley. *International Chemical Engineering & Process Industries,* v. 32, Dec. 1951, p. 577-581.

67 references. (B13)

42-B. The Effect of High Clay Content in Furnace Slags. (In German.) Hans Schrader. *Archiv für das Eisenhüttenwesen,* v. 22, Sept.-Oct. 1951, p. 275-282.

Reasons for increased viscosity of slags with high clay content and methods for alleviating disadvantages arising from this condition. Origin of high clay content; its influence on desulfurization of ferrous metals. (B21, D general, Fe)

43-B. Characteristics of the Development of the Industrial Use of Gas. (In German.) Walter Litterscheidt. *Gas- und Wasserfach,* v. 92, Oct. 31, 1951, p. 260-268.

Gas-fired furnaces; utilization of flue gases: treatment of metals with gases. (B18)

44-B. Control Methods for Sinter. *Metal Progress,* v. 60, Dec. 1951, p. 116, 118, 120. (Condensed from "Testing of Sinter," E. G. Hill and Robert E. Powers.)

Previously abstracted from *American Iron and Steel Institute,* Preprint, 1951. See item 137-B, 1951. (B16, Fe)

45-B. Computation of Mill Recovery. C. C. Dell. *Bulletin of the Institution of Mining and Metallurgy,* Dec. 1951; *Transactions,* v. 61, pt. 3, 1951, p. 101-104.

Formula and chart for determining recovery in beneficiation of ores. (B14)

46-B. The Production of High Temperatures in Industry by Town Gas. *Coke and Gas,* v. 13, Dec. 1951, p. 431-434. (A condensation.)

Previously abstracted from paper by R. F. Hayman in *Gas World.* See item 22-B, 1952. (B18)

47-B. Ion-Exchange Separation of Hafnium and Zirconium. I. E. Newnham. *Journal of the American Chemical Society,* v. 73, Dec. 1951, p. 5899.

Indicates a possible method for use in ore beneficiation. (B14, Zr, Hf)

48-B. Demagnetization of Magnetite. Henry E. Hartig, Nordahl I. Onstad, and Norman J. Foot. *Mines Experiment Station, University of Minnesota,* Information Circular 7, May 1951, 22 pages.

Some results of a study of the magnetic properties of the oxides of iron. Continuous processing of magnetic ores at the Mines Experiment Station. Includes flow diagram and tables. (B14, P16, Fe)

49-B. The Distribution of Radioactivity. C. F. Davidson. *Mining Magazine,* v. 85, Dec. 1951, p. 329-340.

Surveys radioactive mineral resources of the accessible crust of the earth. 26 ref. (B10, EG-h)

50-B. Fuel Economy. IV. Furnace Efficiency. R. J. Sarjant. *Research,* v. 4, 1951, p. 562-568.

Fuels and firing, mechanization, instrumentation, and heat recovery appliances. Diagrams. 16 ref. (B18)

51-B. The Geography of Steel. George H. T. Kimble. *Scientific American,* v. 186, Jan. 1952, p. 44-53.

General account of the raw-materials situation throughout the world. Explains in simple terms how steel is made. (B10, D general, ST)

52-B. Studies of Recovery Processes for Western Uranium Bearing Ores. III. The Recovery of Uranium and Vanadium From Acid Leach Liquors of Carnotite Ores. C. F. Coleman. *U. S. Atomic Energy Commission,* AECD-3238, Nov. 25, 1949, 38 pages.

A series of studies was made using reagents which were known to precipitate U or V. These included, besides hydrolytic precipitation, arsenate, vanadate, and peroxide for uranyl ion; fluoride, oxalate, and p-toluenesulfinate for uranous ion; Fe^{++}, Fe^{+++}, and Pb for vanadate; and phosphate for vanadic ion. Data are tabulated. (B14, U, V)

53-B. Studies of Recovery Processes for Western Uranium-Bearing Ores. V. L. Saine and K. B. Brown, *U. S. Atomic Energy Commission,* AECD-3241, Oct. 14, 1949, 127 pages.

Factors influencing the recoveries of U and V by the salt-roast, acid-leach process. The direct acid-leaching of western ores. (B14, U, V)

54-B. Mineral Forecast. Edward Steidle. *Engineering Experiment Station News,* (Ohio State University), v. 23, Oct. 1951, p. 5-6, 30-37.

Production and consumption trends of mineral products. Demand, supply, resources and availability. Stresses the basic energy problem with the aim of stimulating long-range planning by those directing research programs. (B10, A4)

55-B. Lean Ores; Methods of Beneficiation in Germany. A. E. Lance. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 565-572.

Treatment of iron ores prior to dispatching them to the steel works. (B14, Fe)

56-B. First Free State Gold Mill. *Mining World,* v. 14, Jan. 1952, p. 31-36, 39.

The St. Helena Gold Mines Ltd's. new 80,000-ton-per-month plant now in operation. Includes grinding operations, extraction of Au, Ag, and Zn; and tailing disposal. Flow sheet. (B13, B14, Au, Ag, Zn)

57-B. Ore Potentials For an Expanding Steel Industry. R. G. Paul. *Western Machinery and Steel World,* v. 42, Dec. 1951, p. 89-91.

Trends in the iron and steel industry as regards ore resources. Exploration and development of new ore sources at home and in foreign countries. (B10, Fe, ST)

58-B. Metallurgical Practice at Golden Manitou. D. A. Livingstone. *Canadian Mining and Metallurgical Bulletin,* v. 45, Jan. 1952, p. 16-26; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 55, 1952, p. 15-25.

Golden Manitou Mines, Ltd., in northwestern Quebec, is presently milling, at the rate of 1000 tons daily, a relatively complex sulfide ore and producing, in decreasing order of value, Zn, Ag, Au, Pb, and Cu. The products are a Zn concentrate, a Pb-Ag-Cu concentrate, and Ag-Au precipitate from cyanidation. Flow-sheet developments from the commencement of operations in 1942; reasons for making numerous changes; the shortcomings of the various schemes tried; and present-day practice. (B13, B14, Zn, Ag, Au, Pb, Cu)

59-B. The Aqueous Oxidation of Pyrite. James F. Stenhouse and W. M. Armstrong. *Canadian Mining and Metallurgical Bulletin,* v. 45, Jan. 1952, p. 49-53; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 55, 1952, p. 48-52.

Oxidation of pyrite in caustic solutions under oxygen pressure was investigated by measuring the effect of reaction variables on O_2 consumption by the reactions. From the results, a model for the process is proposed. Application to leaching of sulfide ores is suggested. (B14)

60-B. Titanium—A Critical Review With Special Reference to the Utiliza-

tion of South African Resources. J. J. Frankel, A. M. Schady, and D. J. DuPleissis. *Journal of the Chemical, Metallurgical & Mining Society of South Africa,* Sept. 1951, p. 39-52; disc., p. 52-57.

Location and nature of overseas titanium deposits, methods of processing the ore, and new metallurgical developments Possible utilization of South African Ti resources. 66 ref. (B10, C general, Ti)

61-B. Beneficiation of the Fines From the Dogger-Ore Resources of Kahlenberg. (In German.) Georg Sengfelder. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 4, Oct. 1951, p. 374-377.

Experiments made to concentrate iron ore less than 10 mm. in particle size by the dry magnetic beneficiation method, in which the ore is ground and separated into CaO-rich and Fe-rich concentrates. Flow charts and diagrams. (B14, Fe)

62-B. (Book) **Poverkhnostnoe Besplamennol Gorenie** (Flameless Surface Combustion.) M. B. Ravich. 355 pages. 1949. Academy of Sciences of the U.S.S.R. Moscow and Leningrad, U.S.S.R.

Results of research performed in the fuel and combustion laboratories of G. M. Krzhizhanovskii's Power Institute of the Academy of Sciences and also in other research organizations. Flameless combustion of natural and compressed gases and their properties and possible spheres of application. Influence of various refractories on the process is discussed. Applications in industry, including miscellaneous metallurgical processes. Numerous graphs and diagrams. 399 ref. (B18)

63-B. Size Reduction. Lincoln T. Work. *Industrial and Engineering Chemistry,* v. 44, Jan. 1952, p. 91-94.

Annual review. 73 ref. (B13)

64-B. Ore Companies Look Ahead to Ample Supplies. *Business Week,* Jan. 26, 1952, p. 124-127.

Future sources of iron ore. Improved techniques in the use of this ore. (B10, Fe)

65-B. Processes For Recovering Vanadium From Western Phosphates. Lloyd H. Banning and R. T. C. Rasmussen. *U. S. Bureau of Mines,* Report of Investigations 4822, Dec. 1951, 44 pages.

33 references. (B general, V)

66-B. Beneficiation of Ores by Nuclear Methods. Antoine M. Gaudin, Frank E. Senftle, and Wilfred L. Freyberger. *Technology Review,* v. 54, Jan. 1952, p. 143-144.

How artificially induced radioactivity is being investigated as a means of mineral separation. (B14)

67-B. Canada's Iron Ore Resources; Exploration and Development of the Quebec and Labrador Deposits. J. A. Retty. *Times Review of Industry,* v. 6, Jan. 1952, p. 68, 71.

(B10, Fe)

68-B. U. S. A. Exploits Low Grade Iron Ore. R. H. Warring. *British Steelmaker,* v. 13, Jan. 1952, p. 19-21.

Pelletizing procedures at Beaver Bay, Minn., plant now being constructed. (B16, Fe)

69-B. The Minerals and Metals in Coal. J. L. P. Wyndham. *South African Mining and Engineering Journal,* v. 62, Dec. 15, 1951, p. 659, 661.

Possibilities of utilization. The vitranized portion of the coal matrix contains Ge, V, Mo, Ga, and other elements. Minor constituents take the form of P, As, Cl, and S. (B10)

70-B. Notes on Tin and Mercury. R. O. Forsyth-King. *South African Mining and Engineering Journal,* v. 62, pt. 2, Dec. 22, 1951, p. 711, 713.

Economic prospects of greater Pb supplies from South Africa and of increased production of Hg. (B10, Pb, Hg)

71-B. Drying of Ironstone. R. C. Walthew. *Ceramics,* v. 3, Dec. 1951, p. 513-518.

Process developed for drying iron ores used by a British firm. Data are tabulated. (B15, Fe)

72-B. High Speed Heating: Its Fundamentals and Applications in Industry. Paul A. Furkert. *Industrial Gas,* v. 30, Jan. 1952, p. 11-13, 25-28.

Comparatively new art, with emphasis on localized flame heating and high-head radiant heating, proves highly useful in metallic heating, curing of finishes, cloth singeing, and ink drying. (B18)

73-B. The Extraction and Refining of Germanium and Gallium. A. R. Powell, F. M. Lever, and R. E. Walpole. *Journal of Applied Chemistry,* v. 1, Dec. 1951, p. 541-551.

Sources of Ge and Ga and processes for recovery of these elements from flue dusts and from germanite. (B10, B14, A8, Ge, Ga)

74-B. Metal Economics. I. Primary Resources of Ferrous and Non-Ferrous Metals. *Journal of the Institute of Metals,* v. 80, Jan. 1952, p. 225-237; disc., p. 237-239.

After an introduction by A. J. Murphy, the following papers were presented: "The World Supply of Non-Ferrous Metals, Including the Light Metals," R. Lewis Stubbs; "Metals as Natural Resources," S. Zuckerman; and "World Demand and Resources of Iron Ore," T. P. Colclough. (B10, A4)

75-B. Sintering Iron Ore in England. *Metal Progress,* v. 61, Jan. 1952, p. 107-108, 110, 112. ((Condensed from "Investigation of the Effects of Controlled Variables on Sinter Quality," E. W. Voice, C. Lang, and P. K. Gledhill.)

Previously abstracted from *Journal of the Iron and Steel Institute.* See items 146-B and 147-B, 1951. (B16, Fe)

76-B. Blast Furnace Sinter. *Metal Progress,* v. 61, Jan. 1952, p. 112, 114, 116. (Condensed from "Improving Current Practice in Blast Furnace Sintering," Robert E. Powers.)

Previously abstracted from *American Iron and Steel Institute.* Preprint. 1951. See item 138-B, 1951. (B16, Fe)

77-B. Sinter and Sponge Iron in Swedish Practice. *Metal Progress,* v. 61, Jan. 1952, p. 118, 120, 122. (Condensed from "Sweden's Iron and Steel Industry," T. L. Joseph.)

Previously abstracted from *Journal of Metals.* See item 186-B, 1951. (B general, D general, Fe)

78-B. Manganese Extraction by Carbamate Solutions and the Chemistry of New Manganese-Ammonia Complexes. Reginald S. Dean. *Mining Engineering,* v. 4, Jan. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 193, 1952, p. 55-60.

The widespread occurrence of Mn in low-grade oxide and carbonate ores not amenable to mechanical concentration has led to extensive investigations of hydrometallurgical methods for producing a pure Mn compound suitable for further treatment. Describes a process based on use of a new group of aqueous Mn-NH_3 complex solution, which permits rapid solution of MnO to concentration of 80-100 g. Mn per l. and from which a fully crystalline, easily filtrable $MnCO_3$ is precipitated by the addition of CO_2 and partial NH_3 removal. This process was tested extensively on a wide variety of ores, and good extraction and recovery was obtained. Phase diagrams and tabulated data. 10 ref. (B14, Mn)

79-B. Frothing Characteristics of Pine Oils In Flotation. Shiou-Chuan Sun. *Mining Engineering,* v. 4, Jan. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 193, 1952, p. 65-71.

Design and operation of a frothmeter capable of measuring the frothing characteristics of pine oils and other frothing reagents. Factors affecting the frothability of pine oil. Results show that relative frothabilities of pine oils in the frothmeter generally correlate with those in actual flotation, provided that other factors are kept constant. In addition to pine oils, other well-established flotation frothers were tested. Data are charted and tabulated; apparatus is diagrammed. 12 ref. (B14)

80-B. Manganese—Vital Cog in National Defense. John A. Wood. *New Mexico Miner,* v. 14, Jan. 1952, p. 5, 16-17.

Its importance, foreign and domestic sources and suggestions for increasing domestic production. (B10, Mn)

81-B. On the Emulsification of the Flotation Reagents By Means of Ultrasonic Waves. (In English.) Tadashi Oyama and Sakae Tanaka. *Science Reports of the Research Institutes, Tohoku University,* Ser. A, v. 2, Dec. 1950, p. 925-927.

Concludes that time required can be reduced so that efficiency of flotation is increased; recovery of the ore can be increased; and high selectivity for differential flotation will be expected with lower consumption of the flotation reagents. (B14)

82-B. Cobalt From Roasted Pyrites. (In German.) K. Horalek. *Angewandte Chemie,* v. 63, Nov. 21, 1951, p. 525-527.

Procedure of extracting the Co from iron ore. Data, charted and tabulated, show that Co production varies greatly with time and country and that the Co content of iron ores varies greatly with source. 10 ref. (B15, Co)

83-B. Laboratory and Plant Results With Hydrocyclones. (In German.) C. Krijgsman. *Chemie-Ingenieur-Technik,* v. 23, Nov. 28, 1951, p. 540-542.

Includes discussion on use of hydrocyclonic separators as washing devices in ore beneficiation plants. Diagrams, graphs, and tables. (B14)

84-B. Our Iron and Steel Problem. (In Spanish.) Ricardo Guevara Lizaur. *Instituto del Hierro y del Acero,* v. 4, Jan.-Mar. 1951, p. 24-38; Apr.-June 1951, p. 98-111.

Various production and consumption problems of the Spanish iron and steel industry. Part 1: Raw materials; Part 2: Manufacturing problems. Photographs and tables. (B10, D general, Fe, ST)

85-B. Refractory Linings for Reheating Furnaces. (In Spanish.) V. Letort. *Instituto del Hierro y del Acero,* v. 3, Oct.-Dec. 1950, p. 334-336. (Translated from *Comptes Rendus des Journées de la Grosse Forge.)*

Problems concerning linings for different types of furnaces. (B19)

86-B. Comparative Laboratory Tests With Jaw Crushers. (In Swedish.) Sture Mörtsell. *Jernkontorets Annaler,* v. 135, no. 9, 1951, p. 529-552.

Comparative crushing tests in a Dodge laboratory crusher and in a full-scale Blake jaw crusher were made with a number of different materials with varying characteristics. In some cases the comparison was extended to include tests on a single-toggle crusher. Method of testing. (B13)

87-B. The Utilization of Low Grade Domestic Chromite. K. W. Downs and D. W. Morgan. *Canada Department of Mines and Technical Surveys,* Memorandum Series 116, Oct. 1951, 54 pages.

Canadian and North American reserves of chromite ores, their quality, and possible uses (metallic and nonmetallic), and methods suggested for their beneficiation. Production of the metal from the concentrates by various methods. Numerous tables and graphs.
(B10, B14, C general, Cr)

88-B. Vanadium Recovery From Chromate Liquors. T. S. Perrin, J. N, Jenkins, and R. G. Banner. *Industrial and Engineering Chemistry,* v. 44, Feb. 1952, p. 401-404.

Data are tabulated. (B14, A8, V)

89-B. Production of a Hafnium Concentrate by Adsorption. Gerhard H. Beyer, Alfred Jacobs, and Richard D. Masteller. *Journal of the American Chemical Society,* v. 74, Feb. 5, 1952, p. 825-827.

A process was developed for concentrating Hf from a naturally occurring feed material containing 2% hafnium oxide (based on Hf and Zr content) to approximately 90% hafnium oxide in two cycles, involving adsorption and differential stripping with mineral acids at room temperature. Approximately 70% of the original Hf adsorbed can be recovered as high-Hf concentrate.
(B14, Hf)

90-B. Mining Geology. Olaf N. Rove. *Mining Engineering,* v. 4, Feb. 1952, p. 140-143.

Recently discovered sources of various minerals. (B10)

91-B. Cheaper and Improved Methods of Beneficiating Lower Grade Ores Was Target in 1951. Raymond E. Byler. *Mining Engineering,* v. 4, Feb. 1952, p. 149-155.

Grinding, screening, and materials handling techniques. Improved methods and machines. (B13)

92-B. Adsorption on Quartz, From an Aqueous Solution, of Barium and Laurate Ions. A. M. Gaudin and C. S. Chang. *Mining Engineering,* v. 4, Feb. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 193, 1952, p. 193-201.

Adsorption was measured for barium ion and laurate radical, using radioactive tracers, over a wide range of concentrations. Laurate adsorbed in absence of barium fails to float. With barium, flotation-effective laurate coatings need not exceed 5% of a monolayer. 21 ref.
(B14)

93-B. Investigation of Kasna Creek Copper Prospect, Lake Kontrashibuna, Lake Clark Region, Alaska. *U. S. Bureau of Mines,* Report of Investigations 4828, 10 pages, Dec. 1951. (TN21 Un3r)

The ore-dressing tests made on the samples included gravity concentration with a spiral, magnetic separation, and flotation. (B14, Cu)

94-B. Beneficiation of High-Iron Arkansas Bauxite Ore. W. A. Calhoun, H. E. Powell, and J. F. Hodshire. *U. S. Bureau of Mines,* Report of Investigations 4841, Jan. 1952, 12 pages.

In the laboratory investigation of four high-Fe bauxite samples, a concentration method was developed whereby all of the Al_2O_3 contained could be recovered as abrasive-grade and metal-grade bauxite. The procedure consists of a short (10-15-min.), low-temperature (400-450° C.) oxidizing roast, followed by high-intensity magnetic separation. Subsequent grinding of the magnetic reject to −65 mesh, followed by low-intensity wet magnetic separation gives an improved metal-grade bauxite and an Fe concentrate of potential value. Data are tabulated.
(B14, Al, Fe)

95-B. Concentration of Oxide Manganese Ores From Black Rock, Kramer, and Morgan-Cromar Properties, Tooele and Juab Counties, Utah. J. V. Batty and R. Havens. *U. S. Bureau of Mines,* Report of Investigations 4818, Jan. 1952, 17 pages.

Investigation showed that Morgan-Cromar ores are amenable to concentration by ore-dressing methods, although high recoveries were prevented by the intimate Mn-Si association. Data are tabulated.
(B14, Mn)

96-B. Concentration of Oxide Manganese Ore From Doyle-Smith Claims, Northern Yuma County, Ariz. A. O. Ipsen and H. L. Gibbs. *U. S. Bureau of Mines,* Report of Investigations, 4844, Jan. 1952, 6 pages.

Methods used. Results are tabulated. (B14, Mn)

97-B. Taconite Plants, New Processes Come First in Iron Ore Plans. L. A. Roe. *Engineering and Mining Journal,* v. 153, Feb. 1952, p. 125-127.

Research and development pro-

grams for beneficiating iron ore by flotation, magnetic separation, gravity concentration, heavy-media separation, plus new ideas for metallurgical treatment of iron ores. (B14, Fe)

98-B. Cyclones Set Pace in Milling. *Engineering and Mining Journal,* v. 153, Feb. 1952, p. 128-130.

Usefulness of cyclone in desliming and other classification jobs. Flowsheet illustrates use of cyclones for selective grinding. Other significant developments in milling and concentration of ores. (B13, B14)

99-B. Development in Nonferrous Metallurgy. A. W. Schlechten. *Engineering and Mining Journal,* v. 153, Feb. 1952, p. 131-133.

New leaching techniques for Ni and Co; a new electrothermic process for Zn recovery; and new production techniques for Ti. (B14, C21, Ni, Co, Zn, Ti)

100-B. Review of Cobalt Metal Production—Notes on Literature. John H. Dismant. *Mines Magazine,* v. 62, Jan. 1952, p. 21-23, 44.

Includes uses in the ceramic and metallurgical industries as well as processes for the recovery of Co from roasted pyrites. (B15, C general, T general, Co)

101-B. Types of Charges and Their Effects on Production Rates. A. R. Altman and Edward Walkowski. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 120-125; disc., p. 125-127.

System followed by the Heppenstall Co. in connection with scrap compositions for the openhearth. Data on 20 groups of 50 heats each. Tables and graphs. (B22, D2, ST)

102-B. Quality of Silica Brick. W. S. Debenham and G. R. Eusner. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 129-138; disc., p. 139-141.

Results of an investigation. Tests were conducted with controlled atmospheres and temperatures. (B19)

103-B. Preparation of Scrap. W. H. Steinheider. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 273-275; disc., p. 275-280.

To set up a basis for better ferrous scrap preparation, some investigation done by the Sheffield Steel Corp., Kansas City, indicates the influence of charging rates on heat times. Data are tabulated. (B22, D2, ST)

104-B. Microstructure in Iron-Ore Pellets. Strathmore R. B. Cooke and T. E. Ban. *University of Minnesota,* "Twelfth Annual Mining Symposium," 1951, 26 pages.

Study of the microstructures occurring in the fired pellets produced in the laboratory and on a pilot-plant scale. Numerous micrographs. 11 ref. (B16, Fe)

105-B. The Cyclone as a Separating Tool; Its Use in Mineral Dressing. *Chemical Age,* v. 66, Feb. 16, 1952, p. 275-277. (Condensed from paper by K. A. Fern.)

Principles of operation and variables which effect the process. (B14)

106-B. Fine-Size, Close-Specific-Gravity Solid Separation With the Liquid-Solid Cyclone. J. J. Moder and D. A. Dahlstrom. *Chemical Engineering Progress* (Engineering Section), v. 48, Feb. 1952, p. 75-88.

Demonstrates the above. Design of liquid-solid cyclones for optimum solids separation. The necessary recommendations and equations are presented to construct cyclones for any separation problem. Effects of particle size, gravity difference between solid and liquid, and distribution of the feed slurry to the overflow and underflow streams. Predicted results based on the experimental conclusions are compared with actual cyclone achievements on an industrial material. 12 ref. (B14)

107-B. Experimental Furnace Recovers Manganese From Slag. R. C. Buehl. *Iron Age,* v. 169, Feb. 28, 1952, p. 97-99.

From slag containing from 2.5-11.5% Mn, about 6 out of every 10 lb. of this critical steel ingredient was recovered. The resulting Fe-Mn metal, 56-63% Mn, is suitable for production of ferromanganese. Iron yield may offset much of process's cost so that it can compete with foreign ores. (B21, A8, Mn, Fe-n)

108-B. Mineral Dressing; Need to Approach Self Sufficiency Spurs Construction of New Plants and Research Toward Lower Cost Beneficiation. Nathaniel Arbiter. *Mining Congress Journal,* v. 38, Feb. 1952, p. 52-54. (B14)

109-B. Uranium; Exploration Discloses New Deposits in Hitherto Unsuspected Host Rocks as Mining Activity Increases. *Mining Congress Journal,* v. 38, Feb. 1952, p. 128-130. (B10, U)

110-B. Bagdad Expands Copper Mill—Recovers By-Product Molybdenite—Ups Copper Recovery by pH Control. *Mining World,* v. 14, Mar. 1952, p. 30-33.

Flotation practices for Cu at the

Bagdad Copper Corp., Arizona. Mo recovery process. Flowsheet. (B14, Cu, Mo)

111-B. Round-Up on Titanium. III. The Problems of Extraction and Fabrication. N. P. Harvey. *South African Mining and Engineering Journal,* v. 62, Jan. 5, 1952, p. 813, 815.

Some processes of extraction and production. Powder-metallurgy methods of consolidation. (B general, C general, H general, Ti)

112-B. Fundamental Investigation of Steel Plant Refractories Problem. Part I. Phase Relations in the System $2CaO.SiO_2$-$CaO.SiO_2$-$2CaO.Al_2O_3$-SiO_2-FeO. Arnulf Muan. *Industrial Heating,* v. 19, Feb. 1952, p. 317-318, 320.

Previously abstracted from American Iron and Steel Institute, Preprint, 1951. See item 165-B, 1951. (B19, D general, ST)

113-B. Copper as a Contaminant in Openhearth Steel. (In German.) Georg Rockrohr. *Stahl und Eisen,* v. 72, Jan. 31, 1952, p. 118-122.

Surveys the Cu content of scrap and openhearth pig iron from 1926 to 1950 in Germany. A method for the determination of Cu in steel. (B22, D2, S11, ST)

114-B. Research on the Possibility of Using Float-and-Sink and Sedimentation Processes in the Beneficiation of Siegländer Siderite. (In German.) Hubert Gleichmann. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 5, Jan. 1952, p. 1-8.

Experimental results show that process can be successfully applied when the grain sizes of siderite range from 100 to 0.25 mm. in diam. Diagrams, tables, and graphs. (B14, Fe)

115-B. Flotability of Various Grain Sizes Depending on the Consistency of the Flotation Suspension. (In Russian.) V. I. Klassen and R. Z. Erenburg. *Doklady Akademii Nauk SSSR,* new ser., v. 74, Aug. 11, 1951, p. 855-857.

Investigated over a considerable range of particle sizes and densities of the suspension. Data are charted. (B14)

116-B. (Book) **Mellor's Modern Inorganic Chemistry.** G. D. Parkes. 967 pages. 1951. Longmans, Green and Co., 55 Fifth Ave., New York 3, N. Y.

Includes sections on sources of metals, occurrence of ores, and methods used for their preliminary treatment, and a summary of the various types of metallurgical processes in use, with examples indicating the principles on which the choice of method for any particular metal depends. (B general)

117-B. (Book) **The Wealth of India. Raw Materials. Vol. II. Part. 1.** B. N. Sastri, editor. 427 pages. 1950. Government of India Press, New Delhi.

Indigenous plants and natural resources of India, whose names begin with the letter "C". Numerous illustrations. Includes tabular and graphical data on production, imports, exports, etc. (B10, A4)

118-B. World's Major Titanium Mine and Smelter Swing Into Full-Scale Production. Alvin W. Knoerr. *Engineering and Mining Journal,* v. 153. Mar. 1952, p. 72-79.

Surveys plant located at Sorel, Quebec. Flowsheet and description of the refining process used to produce a rich Ti slag and iron. (B12, C21, Ti, Fe)

119-B. Wear Resistance; Steelworks Applications of Cast Basalt. *Iron & Steel,* v. 25, Mar. 1952, p. 84.

Properties of cast basalt and use for various refractory and abrasion resisting parts. (B19, T5)

120-B. New FluoSolids Experience. G. G. Copeland. *Mining Congress Journal,* v. 38, Mar. 1952, p. 42-44, 54.

Recent developments in the fluidized-bed process with special application to sulfide roasting for production of SO_2. (B15)

121-B. Ultra-Fine Grinding and Classification With Fluid Jet Pulverizers. M. F. Dufour and J. B. Chatelain. *Mining Engineering,* v. 4, Mar. 1952, p. 262-264.

Process for size reduction. Materials processed by this grinding method include nonmetallic and metallic minerals, ores, metals, and numerous other organic and inorganic products. (B13)

122-B. Contact Angles and Surface Coverage. W. Philippoff, S. R. B. Cooke, and Donald E. Cadwell. *Mining Engineering,* v. 4, Mar. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 193, 1952, p. 283-386.

Investigation to determine quantitative relationships between the surface coverage of the mineral by the reagent, length of the hydrocarbon chain, and contact angle in flotation. (B14)

123-B. Concentration of Oxide Manganese Ores From Vicinity of Winkelman, Pinal County, Ariz. K. C. Dean, H. D. Snedden, and W. W. Agey. *U. S. Bureau of Mines,* Report of Investigations 4848, Feb. 1952, 21 pages. (B14, Mn)

124-B. The Application of Ceramic Materials in Foundries and Steel Mills. (In French.) Marcel Guedras. *Métal-*

lurgie et la Construction mécanique, v. 84, Feb. 1952, p. 87-88.

Various properties of a graphitized aluminum silicate called "Refractolithe", and its application in smelter liners and other uses. (B19)

125-B. Sampling of Lump-Form Solid Materials by a Random Method. (In French.) A. Palazzi. *Revue de Métallurgie,* v. 49, Jan. 1952, p. 22-34; disc., p. 34.

Sampling for chemical analyses and for other tests; calculation of the weight of the sample, reduction of the sample, determining the diameter of the pieces, accuracy of results, and sampling on an experimental basis. Charts, diagrams, and tables. (B11)

126-B. Acid Smelting of Manganese-Containing Iron Ores for the Production of Synthetic Manganese Ores and Their Smelting for Ferromanganese Production. (In German.) Paul Ischebeck and Jacob Willems. *Archiv für das Eisenhüttenwesen,* v. 23, Jan.-Feb. 1952, p. 1-14; disc., p. 14-15.

Reviews the literature on methods of stepwise oxidation and reduction for production of Mn-rich concentrates and of ferromanganese from iron ores. Laboratory tests prove the possibiilty of synthesizing low-phosphorus Mn slags by acid smelting of Mn-containing iron ores; and large-scale experiments prove the industrial feasibility of the process. Data are tabulated and graphed. 38 ref. (B15, D8, Fe-n, Mn)

127-B. Specific Electrical Conductivity of Slags Containing Ferrous Oxide. (In German.) Wilhelm Anton Fischer and Hans vom Ende. *Archiv für das Eisenhüttenwesen,* v. 22, Nov.-Dec. 1951, p. 417-423.

Investigations on slags of various compositions in the molten state. From the temperature dependence of specific conductivity, the activation energy of all but the semiconductive slags was calculated. Data are tabulated and charted. (B21, Fe)

128-B. Copper and Copper Alloys. 6. Concerning the Metallurgy of Copper. (Continued.) (In German.) W. G. R. DeJager. *Metalen,* v. 7, Feb. 15, 1952, p. 50-52.

The semifinished forms of Cu-ingots, anodes, bars, billets, cathodes, cakes, slabs, billets, etc. Amounts of permissible impurities in different types are tabulated. Production methods from ores. Includes flow diagram. (B general, C21, Cu)

129-B. The Earth's Known Uranium Ore Deposits. (In German.) E. Kohl. *Metall,* v. 6, Feb. 1952, p. 92-97.

Some tabulated data supplement discussion by countries and continents. (B10, U)

130-B. Mining and Smelting Industry of Finland. (In German.) Eero Mäkinen. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 4, Dec. 1951, p. 445-446.

Principal types of ore found in Finland and the companies mining and processing them. (B10, B general, C)

131-B. Air-Bubble and Flotation Processes. (In German.) Philipp Siedler. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 5, Feb. 1952, p. 49-54.

A review on the basis of the literature, particularly the role of the carrier gas, forces at the boundary surface, and the problem of adhesion of the mineral particle to the air bubble. Theories on the interpretation of these phenomena. 23 ref. (B14)

132-B. Problems in the Roasting of Magnetized Iron Ore in Rotating Kilns. (In German.) Walther Walbrecker. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 5, Feb. 1952, p. 54-61.

Practical suggestions, particularly concerning grain size, determination of optimum roasting temperature, and duration of roasting and cooling. Constructional changes practical for an increase of the output of smaller furnaces. Data are tabulated and charted. (B15, Fe)

133-B. Theory of Magnetic Separation of Weakly Magnetic Ores. (In Russian.) V. G. Derkach. *Izvestiia Akademii Nauk SSSR,* Section of Technical Sciences. June 1951, p. 852-862.

An investigation was made by an analysis of the magnetic and mechanical forces acting on the pieces of ore. Includes both theoretical curves for magnetic ores in general and for Mn and Fe ores. (B14, Mn, Fe)

134-B. Change of Electrical Resistance of Magnetite During Magnetization. (In Russian.) M. A. Grabovskii. *Izvestiia Akademii Nauk SSSR,* Geophysical Series, July-Aug., 1951, p. 61-70.

Results of investigation are considered from the standpoint of the theory of ferromagnetism. Data are charted. 22 ref. (B15, B16, Fe)

135-B. Protective Action of Ammonium Salts During Flotation of Pyrites, Arsenopyrites and Certain Other Sulfide Minerals in Calcareous Media. (In Russian.) I. N. Plaksin and G. A.

Miasnikova. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, July 1951, p. 1046-1064.

Studies were made on action of lime and NH_4Cl during flotation of above minerals. The specific action on each of the minerals was determined. Data are tabulated and charted. 21 ref. (B14)

136-B. Treatment of Manganese Slimes and Ores With Sulphur Dioxide Gas. (In Russian.) V. M. Kakabadze. *Zhurnal Prikladnoi Khimii*, v. 24, July 1951, p. 682-689.

The conversion of $MnCO_3$ ores to $MnSO_3$ by SO_2 gas followed by oxidation to $MnSO_4$ was investigated. Combinations of this treatment with roasting and H_2SO_4 treatment. Data are tabulated and charted. (B14, B15, Mn)

137-B. The Adsorption of Sodium Cetyl Sulphate on Cassiterite. G. R. Edwards and W. E. Ewers. *Australian Journal of Scientific Research*, ser. A, v. 4, Dec. 1951, p. 627-643.

Adsorption on pure synthetic cassiterite was measured under various conditions of concentrataion and pH, and the results related to flotation. Only a small proportion of the surface need be covered with collector ions to make flotation possible. A mechanism for adsorption of cetyl sulfate ions is proposed, in which these ions exchange with hydroxyl ions on the hydrated surface. Samples of natural cassiterite differed from one another and from the synthetic mineral, in their ability to be floated under certain conditions. This is attributed to the effect of metallic impurities. 20 ref. (B14, Sn)

138-B. New Methods in the Statistical Evaluation of Mine Sampling Data. Herbert S. Sichel. *Bulletin of the Institution of Mining and Metallurgy*, Mar. 1952; *Transactions*, v. 61, pt. 6, 1951-52, p. 261-288.

A new procedure, based on Fisher's theory of maximum likelihood, is suggested as a replacement of the conventional arithmetic mean. Both the *t* estimator and the arithmetic mean are unbiased estimates of the true unknown average grade. The *t* estimator has the advantage of having a reliability higher than the arithmetic mean; being less sensitive to occasional high assays; and lying nearer to the true mean grade in the majority of cases. Tables facilitating computation of *t* are given in the Appendix. 15 ref. (B11)

139-B. Hydrogen Tube Reduces Oxides. *Chemical Engineering*, v. 59, Mar. 1952, p. 252.

Recent pilot-plant work shows that metallic oxides can be reduced continuously with hydrogen in a simple furnace. Close temperature control is vital. Work was done on iron oxides, but application to other metals is believed feasible. (B15, Fe)

140-B. A New Solvent Extraction Method for the Separation of Niobium and Tantalum. G. W. Leddicotte and F. L. Moore. *Journal of the American Chemical Society*, v. 74, Mar. 20, 1952, p. 1618.

A preliminary report, including tables. (B14, Cb, Ta)

141-B. Electric Furnace Ferro-Alloys and Calcium Carbide. Joseph H. Brennan. *Journal of the Electrochemical Society*, v. 99, Mar. 1952, p. 61C-63C.

A review of production. (B22, Fe-n)

142-B. The Mineral Resources of Jordan. A. M. Quennell. *Mining Journal*, v. 238, Mar. 14, 1952, p. 266-267. (Based on paper in *Colonial Geological Surveys*, v. 2, No. 2.)

Resources of metallic and nonmetallic minerals, and bituminous limestone. (B10)

143-B. How To Produce More Tungsten. Blair Burwell. *Mining World*, v. 14, Apr. 1, 1952, p. 33-37, 88.

Metallurgical results and operating costs of Salt Lake City chemical tungsten refinery. Integration of tungsten milling and chemical refining plants should create a market for low-grade material and assure production from many new mines. (B13, B14, W)

144-B. Plans for Steel Mill in Peru; Project Extending Industrialization in Latin America to Go Ahead. *Times Review of Industry*, new ser., v. 6, Mar. 1952, p. 85.

Plans for development of the Marcona iron ore deposits near Lima. (B10, A4, ST)

145-B. Process for Recovering Gold and Silver From Activated Carbon by Leaching and Electrolysis. J. B. Zadra, A. L. Engel, and H. J. Heinen. *U. S. Bureau of Mines* Report of Investigations 4843, Feb. 1952, 32 pages.

Modified process for removal or desorption of both Au and Ag from loaded carbon. This process permits use of activated carbon for extracting both metals from Au ores carrying enough Ag to have economical interest, or in which Ag is the predominant value. Hot caustic cyanide solution at atmospheric pressure is used for extraction of both Au and Ag from activated carbon by simultaneous leaching and electrolysis. (B14, Au, Ag)

146-B. Benefication of Oxide Manganese Ores From Arapahoe, Douglas, Saguache, Custer, Chaffee, and Park Counties, Colo. R. R. Wells, K. C. Vincent, and T. F. Mitchell. *U. S. Bureau of Mines,* Report of Investigations 4845, Feb. 1952, 16 pages. (B14, Mn)

147-B. Manganese Concentrates From Open-Hearth Slags by Lime-Clinkering (Sylvester) Process. John A. Ruppert. *U. S. Bureau of Mines,* Report of Investigations 4847, Feb. 1952, 26 pages.

It has been proposed that addition of enough limestone to an open-hearth slag to give a $CaO{\cdot}3P_2O_5/SiO_2$ ratio of approximately two, followed by firing in an oxidizing atmosphere under proper conditions of time and temperature, will result in a clinker having a magnetic phase containing a preponderance of Mn, Fe, Al, and Mg as oxides and a nonmagnetic phase consisting for the most part of a phosphorus-containing dicalcium silicate. It has been postulated further that the metal oxide phase can be recovered by fine grinding and magnetic separation. These broad principles have been substantiated by numerous clinkering operations made in various types of kilns. Diagrams and charts. (B21, D2, Mn)

148-B. Concentration of Oxide Manganese Ores From San Bernardino County, Calif. W. W. Agey, S. J. Hussey, and W. J. Long. *U. S. Bureau of Mines,* Report of Investigations 4846, Feb. 1952, 14 pages.

Test work included heavy-media separation, tabling of sized fractions, manganese flotation and flotation of table slimes; jigging; magnetic concentration; etc. (B14, Mn)

149-B. Magnetic Separation. R. H. Stearns. "Encyclopedia of Chemical Technology. Vol. 8" (Interscience Encyclopedia, New York), 1952, p. 624-638.

Equipment and procedures. Applicability of the process to various ores and other materials. (B14)

150-B. The Presence of Uranium in North African Phosphates. (In French.) Antoine A. Guntz. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Feb. 18, 1952, p. 868-870.

Composition of specimens taken from different parts of North African phosphate beds which indicate the presence of uranium. (B10, U)

151-B. Discovery of Uranium in the Phosphate Deposits of Morocco. (In French.) André Lenoble, Henri Salvan, and Valéry Ziegler. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Feb. 25, 1952, p. 976-977.

A series of measurements of the density of β and γ radiations in the phosphate deposits of Morocco was made. (B10, U)

152-B. Caribbean Bauxite. (In French.) G. A. Baudart. *Revue de l'Aluminium,* v. 29, Jan. 1952, p. 1-3.

Known since 1869, and rediscovered in 1942, Jamaican bauxite bodies are moving into the picture as the main source of supply for the North American aluminum producers. Three companies, one Canadian and two American, are setting up mining and ore treatment plants. The geographical position of the island, compared with that of the Guianas, will lead to a more than 50% cut on the present sea journey of the ore to the American plants on the Gulf. (B10, Al)

153-B. Theory of Crushing of Rocks (Minerals). II. Separation of Particles Into Two Fractions and Calculation of the Average Composition of These Fractions. (In Russian.) B. M. Zviagin, R. B. Rozenbaum, O. M. Todes, and A. Z. Iurovskii. *Izvestiia Akademii Nauk SSSR,* Section of Technical Sciences, Aug. 1951, p. 1218-1229.

Method for determination of the relative number of floated and settled particles during their separation into two fractions. Data are tabulated and charted. (B14)

154-B. The Alchemy of Arvida. Wm. G. Dulmage. *Canadian Chemical Processing,* v. 36, Mar. 1952, p. 70-71, 74.

Role of chemistry at Alcan (Canada) by following through the various steps in Al production in normal sequence, particularly concerning alumina. Production of HF, AlF_3, synthetic cryolite, NaOH, carbon lining and electrodes, and alum. Flow sheet. (B14, Al)

155-B. The Utilization of Low-Grade Domestic Chromite. K. W. Downes and D. W. Morgan. *Canadian Mining and Metallurgical Bulletin,* v. 45, Mar. 1952, p. 167. (A condensation.)

Seven pertinent chemical processes which have been developed for beneficiation of chromite ores. (B14, Cr)

156-B. Chemicals From Pyrites. *Journal of Southern Research,* v. 4, Mar.-Apr. 1952, p. 11-13.

Ore refining and research at Tennessee Corp., where a variety of products are developed based on Cu resources. They have taken over a 100-yr.-old Cu mining activity and established a modern chemical processing enterprise that is producing

an ever-growing list of valuable products. (B general, Cu)

157-B. Factors Affecting Flotation. Part I. H. J. Gisler. *Pit and Quarry,* v. 44, Mar. 1952, p. 121-125, 131.

Reprinted with changes from a Denver Equipment Co. bulletin. Methods of controlling grade of ore, tonnage, grind, dilution, time, temperature, and reagents. (To be continued.) (B14)

158-B. Joint Action of Certain Reagent-Collectors During Flotation Concentration. (In Russian.) I. N. Plaksin and V. A. Glembotskii. *Doklady Akademii Nauk SSSR,* new ser., v. 82, Jan. 1, 1952, p. 139-141.

Mixtures of ethyl and isoamyl xanthates were used in flotation experiments with various sized particles of galena. Results are tabulated. (B14, Pb)

159-B. (Book) **Mineral Forecast 2000 A. D.** Edward Steidle. 152 pages. 1952. School of Mineral Industries, Pennsylvania State College, State College, Pa. (Circular 39.)

Reviews our dependence on outside sources for various strategic and critical mineral supplies, together with the necessity for down-to-earth mineral policies. How education and research can constantly point out new directions of effort and prove that what we lack in quality resources can be offset by better brains and skills. Establishes a long-range goal toward which the activities of Pennsylvania's School of Mineral Industries can be directed. (B10, A3)

160-B. Iron-Ore Beneficiation—Present Practices and Trends. Stephen E. Erickson. *Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 10, 1951, p. 4-12; disc., p. 12-18.

Includes seven typical flow diagrams (B general, Fe)

161-B. Low-Temperature Coke as a Reactive Carbon. C. E. Lesher. *Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 10, 1951, p. 19-29; disc., p. 29-36.

Previously abstracted from *Mining Engineering.* See item 195-D, 1950. (D1, B22, Fe)

162-B. A Look at Sweden's Iron and Steel Industry. T. L. Joseph. *Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 10, 1951, p. 36-43; disc., p. 43.

Previously abstracted from *Journal of Metals.* See item 186-B, 1951. (B general, D general, ST)

163-B. Recent Advances in Sintering-Plant Design and Operation. M. F. Morgan. *Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 10, 1951, p. 91-103; disc., p. 114-121.

Diagrams and illustrations show principally equipment designed and constructed by Arthur G. McKee and Co., for sintering of iron ores. (B16, Fe)

164-B. Design of a Recent Sintering Plant. C. G. Bigelow. *Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 10, 1951, p. 103-110; disc., p. 114-121.

Sintering plant installation with a rated capacity of 2400 net tons of sinter a day, consists of two 72-in. by 118-ft. 16-windbox Dwight-Lloyd type machines together with necessary auxiliary equipment. Primary function of the plant is to sinter the current production of flue dust from the blast furnaces, as well as stock dust, filter cake recovered from the blast furnace, gas-washing water, rolling-mill scale, and fine ore. (B16, Fe)

165-B. Nonferrous Sintering Plants. A. A. Nilsen and W. J. Urban. *Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 10, 1951, p. 110-114; disc., p. 114-121.

See abstract of "Sintering Nonferrous Metals", *Journal of Metals;* item 94-B, 1951. (B16, EG-a)

166-B. Physical Tests and Results on Some Agglomerated Iron Ores. F. M. Hamilton. *Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 10, 1951, p. 135-140; disc., p. 142-152.

Reviews a portion of a recent AIME paper *(Mining Engineering,* v. 187, Dec. 1950; item 6-B, 1951), plus some additional information obtained since that paper was prepared. Sampling, laboratory-crush and tumbler tests, and laboratory-reducibility procedures and apparatus. Typical data are charted. (B16, Fe)

167-B. Testing of Iron Ores and Agglomerates Related to Blast-Furnace Use. R. J. Morton. *Blast Furnace,*

Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings, v. 10, 1951, p. 122-134; disc., p. 142-152.

Work directed mainly to methods of testing iron ores and agglomerates for strength, decrepitation, porosity, and reducibility, in an attempt to develop significant testing procedures. Apparatus is diagrammed and illustrated; data are tabulated and charted. (B22, D7, Fe)

168-B. A Strength Test for Sinter. Reed W. Hyde. *Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings,* v. 10, 1951, p. 141-142; disc., p. 142-152.

Method was developed to give comparative strength data by a simple procedure that does not require special testing equipment. It has been used at Sintering Machinery Corp.'s testing plant for some time. (B16, Fe)

169-B. Canada's Chromium Problems; Low-Grade Domestic Ores Investigated. *Chemical Age,* v. 66, Apr. 5, 1952, p. 513-514.

A survey conducted by the Extractive Metallurgy Section, Div. of Mineral Dressing and Process Metallurgy, Mines Branch, Ottawa. (B general, Cr)

170-B. Preliminary Studies on the Biogeochemistry of Iron and Manganese. Harry V. Warren, Robert E. Delavault, and Ruth I. Irish. *Economic Geology,* v. 47, Mar.-Apr. 1952, p. 131-145.

Use in prospecting. Tabular data. (B10, Fe, Mn)

171-B. How to Calculate Power Loads for Thickeners. Roman Chelminski. *Engineering and Mining Journal,* v. 153, Apr. 1952, p. 89-91.

Details are presented and graphically interpreted. (B14)

172-B. Mining and Milling at Reocin, Spain. T. E. Abrey. *Mine & Quarry Engineering,* v. 18, Apr. 1952, p. 117-122.

A detailed survey and analysis with specific reference to mine owned by a Belgian company. Ore worked at present contains Zn, Pb, Fe, MgO, and lime. (B12, B13, Zn, Pb, Fe)

173-B. New Developments in Ore Dressing in 1951. James J. Bean. *Mines Magazine,* v. 42, Mar. 1952, p. 51-52, 68.

Iron ore beneficiation; new types of equipment; cyclone separating process; magnetic separation; flotation plants; sulfur ore treatment; cobalt treatment; and miscellaneous minerals and processes. (B14, Fe)

174-B. Uranium Production in Colorado Plateau Area. Frank H. MacPherson. *Mines Magazine,* v. 42, Mar. 1952, p. 53-54, 88. (B10, B12, U)

175-B. Unprecedented Expansion in the Mining Industry. James K. Richardson. *Mining Engineering,* v. 4, Apr. 1952, p. 351-355.

Brief summary of major developments contemplated or under way in the U. S. minerals field. (B12)

176-B. Manganese: Sources and Beneficiation. *Mining Engineering,* v. 4, Apr. 1952, p. 360.

A brief account of the present status. (B general, Mn)

177-B. Taconites Beyond Taconites. N. M. Levine. *Mining Engineering,* v. 4, Apr. 1952.

Possibilities of using low-grade iron ores, exemplified by a study of deposits in Iron County, Wis. Tentative metallurgical flowsheet. (B10, Fe)

178-B. Radiotracer Studies of the Action of Dithiophosphate in the Selective Flotation of Galena and Sphalerite Using $CuSO_4$ and NaCN. C. M. Judson, A. A. Lerew, R. B. Booth, J. S. Kennedy, and G. L. Simard. *Mining Engineering,* v. 4, Apr. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 193, 1952, p. 375-380.

A study of the distribution of dithiophosphate during selective flotation of galena and sphalerite from quartz in a Fagergren machine, using NaCN to depress and $CuSO_4$ to reactivate the sphalerite. Single flotations of galena and sphalerite from quartz were studied. (B14, Pb, Zn)

179-B. Some Dynamic Phenomena in Flotation. W. Philippoff. *Mining Engineering,* v. 4, Apr. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 193, 1952, p. 386-390.

A possible mechanism for the attachment of a conditioned mineral particle to a rising bubble has been developed. The mechanism, as distinct from the static equilibrium, accounts for the more difficult flotation of fines and slimes, and supplements the probability calculations of Gaudin and of Sutherland. Tabular data. 22 ref. (B14)

180-B. Nine Steel Firms Active in Six New Iron Ore Ventures. David N. Skillings. *Skillings' Mining Review,* v. 41, Apr. 26, 1952, p. 1-2, 19.

Six large ventures in iron ore, domestic and foreign, appear to be moving the geographical center of iron ore mining eastward in the Western Hemisphere—the Labrador ore fields and the Venezuela ore fields are the new potent lines of force. (B10, ST, Fe)

181-B. The Influence of Gases on the Flotation of Nonsulfide Minerals. (In Russian.) I. N. Plaksin and E. M. Chaplygina. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Jan. 21, 1952, p. 451-453.

Various ores and minerals were treated with oxygen, nitrogen, and air before flotation. Results are discussed and charted for quartz, fluorite, calcite, iron oxides, copper ores, etc. (B14)

182-B. Contemporary State of Flotation Theory. (In Russian.) I. N. Plaksin. *Vestnik Akademii Nauk SSSR*, v. 21, Apr. 1951, p. 28-34.

A review and discussion of mineral flotation theory with emphasis on Soviet developments. (B14)

183-B. Alloying Zirconium to Magnesium. W. P. Saunders and F. P. Strieter. *American Foundrymen's Society*, Preprint 52-78, 1952, 10 pages.

Merits of several Zr-containing materials were investigated. Use of a master alloy containing about 40% Zr, balance Mg, appears to possess many advantages over both metallic Zr and Zr salts. Tables and graphs. 58 ref. (B22, Zr, Mg)

184-B. The Tungsten Situation in Montana as a Factor in National Defense. Donald W. McGlashan. *Bureau of Mines and Geology, State of Montana*, Miscellaneous Contribution 12, 1952, 47 pages.

Resources and detailed economic analysis of prospects for increased utilization of Montana tungsten ores. Tables and graphs. (B10, W)

185-B. Oxidation-Reduction: News in Inorganics. *Chemical Engineering*, v. 59, Apr. 1952, p. 161-168.

Use of oxygen in boosting production of steel and S; hydrazine; ozone; nitrogen tetroxide; production of high pressure, low-cost ammonia; S from H_2S; reduction furnaces; producing the "rare" metals by reduction with hydrogen and metals and by silicothermic and electrolytic reduction; and direct reduction in a fluidized bed. 12 ref. (B22, C general, D general, ST)

186-B. Flotation and Electrostatic Separation of Beach Sands From South Woodburn, N.S.W. *Commonwealth Scientific and Industrial Research Organization and Mining Department, University of Melbourne*, Joint Investigation 379, 7 pages.

Zircon and rutile were recovered, in reasonably good yields and grades. (B14, Ti, Zr)

187-B. Concentration of Tin Ore From the Belmont Tin Mine, Torrington District, N.S.W. *Commonwealth Scientific and Industrial Research Organization and Mining Department, University of Melbourne*, Joint Investigation 387, June 15, 1951, 5 pages.

Classification, tabling, and magnetic concentration. (B14, Sn)

188-B. Concentration of Tin Ore from Mt. Masson, N.T. *Commonwealth Scientific and Industrial Research Organization and Mining Department, University of Melbourne*, Joint Investigation 393, 4 pages.

Classification, tabling, and magnetic concentration. (B14, Sn)

189-B. The Occurrence of Lead in Blast Furnace Slag at Broken Hill Associated Smelters, Port Pirie, South Australia, and Its Recovery by Flotation. *Commonwealth Scientific and Industrial Research Organization and Mining Department, University of Melbourne*, Joint Investigation 397, July 10, 1951, 12 pages.

Analytical procedures developed, and mineragraphic examination. Flotation and magnetic-concentration test data are tabulated. Economic and technical pros and cons. (B14, A4, Pb)

190-B. Rare Earths Improve Properties of Many Ferrous Metals. Parts 1 and 2. W. E. Knapp and W. T. Bolkcom. *Iron Age*, v. 169, Apr. 24, 1952, p. 129-134; May 1, 1952, p. 140-143.

Use and effects of "Lan-cer-amp". History of comparable additions, and hypotheses in explanation of its behavior. Lan-cer-amp containing more La than regular misch metal is being used as ladle addition in stainless, toolsteel, alloy and electrical steel grades. Not all benefits derived from rare-earth additions can be attributed to S reduction. Effect on N content may be more important. Gives effect on ductility and toughness of Cr-Ni-Mo. Lists properties of rare earths. 28 ref. (B22, ST, EG-g)

191-B. Concentration of Oxide and Silicate Manganese Ores From Siskiyou and Mendocino Counties, Northern California. G. M. Potter. W. G. Sandell, and K. C. Vincent. U. S. Bureau of Mines, Report of Investigations 4849, Mar. 1952, 14 pages.

Results of gravity concentration, flotation, and sintering tests on

ores of three types from three distinct districts. (B14, B16, Mn)

192-B. Mineral Dressing Investigation of Titanium Ore From the Christy Property, Hot Springs County, Ark. M. M. Fine and D. W. Frommer. U. S. Bureau of Mines, Report of Investigations 4851, Mar. 1952, 7 pages.

Flotation research on samples of residual brookite ore and a drill-hole composite from the Christy Property showed that high-grade flotation concentrates can be produced. Success of the flotation depends, to a considerable extent, on an adequate preflotation treatment including an alkaline blunge and nearly complete slime removal from the ground ore. The brookite can be activated with a heavy metal salt and floated with a soluble soap. Final concentration of the brookite is effected by cationic flotation in an acid circuit. Possibility of recovery of by-product vanadium. 10 ref. (B14, Ti, V)

193-B. Annual Review of the Mining and Oil Industries in Western Canada. *Western Miner,* v. 25, Apr. 1952.

The entire issue is devoted to articles on various parts of Canada and Alaska with respect to different aspects of mining and oil. (B12)

194-B. The Precision of Basic Technological Indices and Engineering Calculations for Ore-Extraction Processes. (In Russian.) L. I. Baron. *Izvestiia Akademii Nauk SSSR,* Section of Technical Sciences, Sept. 1951, p. 1346-1355.

Variations of important indices characterizing extraction and treatment of ores were investigated. Degree of influence of various factors and groups of factors. Precision of various empirical approximations used in the mining industry. Data are charted. 12 ref. (B12)

195-B. Experimental Refractory Bodies of High-Melting Nitrides, Carbides, and Uranium Dioxide. P. Chiotti. *Journal of the American Ceramic Society,* v. 35, May 1, 1952, p. 123-130.

A procedure for the preparation of nitrides and carbides of several metals and preparation of refractory bodies from them. Evidence showing the tendency of Be_3N_2, TaN, and ThN toward instability at high temperatures. The hexagonal structure reported by others for TaN is actually that for Ta_2N. A lattice for Th_2N_3 is proposed. The melting points of ThN, UN, and UC are determined. (B19, C-n)

196-B. Low Base Metal-High Silver Ores Give Better Smelter Returns With Pre-Cyanidation Treatment. R. R. Bryan. *Mining Engineering,* v. 4, May 1952, p. 464-468.

Development of precyanidation flotation by Cia. de Real del Monte y Pachuca, Mexico, and metallurgical results of precyanidation flotation. Evaluation of flotation vs. straight cyanidation, and operating data. Tabular data. (B14, Ag)

197-B. Estimates of Selected World Mineral Supplies by Cost Range. Elmer W. Pehrson. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources," 1951, p. 2-4; disc., p. 35-39.

Tables compare production rates and estimated reserves of various metals and minerals. (B10)

198-B. Mineral Supplies and Their Measurement (Iron-Manganese). Andre Legendre. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources," 1951, p. 4-12; disc., p. 35-39.

Reserves of Fe and Mn, the two principal metals used in the iron and steel industry. 12 ref. (B10, Fe, Mn)

199-B. Geographical Factors in the Utilization of the Mineral Resources of Brazil. S. Froes Abreu. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 17-21; disc., p. 35-39.

The greater part of the mineral production in Brazil comes from a narrow strip along the eastern coast. Principal minerals and ores produced, reserves, grades, and geographical conditions favorable or unfavorable to their economic utilization. 14 ref. (B10)

200-B. Mineral Resources of India. M. S. Krishnan. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 67-69; disc., p. 97-103.

Brief review. (B10)

201-B. Lead and Zinc Resources in Sardinia. Mario Carta. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 70-75; disc., p. 97-103.

Includes graphs and tables. (B10, Pb, Zn)

202-B. Metallic Mine Mechanization to Increase Recovery; Mining and Concentrating in Sweden. Sven Dalhammar. "Proceedings of the United

Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources," 1951, p. 110-113; disc., p. 166-170.

Advantages of mechanization to get better recovery and higher-grade concentrates. Some sink-float plants are mentioned. Crushing or grinding in iron-ore concentration. The Loewenhielm dewatering device. Examples of the recovery of byproducts include flotation of apatite and flotation of pyrite in both sulfide and iron-ore concentration. (B general)

203-B. New Processes for the Utilization of Low Grade Ores. R. W. Diamond, C. O. Swanson, and B. P. Sutherland. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 140-146; disc., p. 166-170.

Concerned mainly with cost factors. Low-grade ores are divided into two classes; simple ores of low metal content, and complex ores. In the first type, crushing and grinding form an important part of the total cost. The general trend is toward larger-sized units, together with adoption of automatic controls and greater mechanization in handling of materials. In the separation processes, gravity methods are especially suitable. Recent advances in treatment of complex low-grade ores (the second type) are use of induced superficial oxidation, a fluidized bed for roasting and calcination, controlled crystallization of mattes, improved reagents in flotation, and electrostatic separation. 33 ref. (B13, B14, B15)

204-B. New Processes for the Utilization of Low-Grade Ores. John D. Sullivan. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 146-152; disc., p. 166-170.

Tables and graphs show progress in various lines over the years. 16 ref. (B general)

205-B. Economic Mineral Dressing as the Preliminary Condition for Inexpensive Large-Scale Mining; Methods of Utilization of Low-Grade Iron Ores. Ernst Bierbrauer. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 163-165; disc., p. 166-170.

In order to beneficiate the siderite ore of the Styrian Iron Mountain in Austria, a low-cost separation process for coarse ores has been developed. This process is something intermediate between jigging and heavy-media separation. A standard jig is able to treat coarse ores from 40 to 150 mm. in size without raising the normal plunger velocity. (B14, Fe)

206-B. A Note on the Use of Gaseous Oxygen. D. J. O. Brandt. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources," 1951, p. 176-179; disc., p. 204-210.

Production on a "tonnage" scale, and uses in steelmaking and in manufacture of ferro-alloys. (B22, ST, Fe-n)

207-B. Rare Earths: Their Ores and Their Applications. (In Portuguese.) Othon H. Leonardos. *Boletim da Associacao Brasilera de Metais*, v. 7, Oct. 1951, p. 494-519; disc., p. 519.

Methods of production and properties and application in metallurgy and other branches of science and technology. Special attention is given to Th, Ce, and the monazite deposits of Brazil. Table gives chemical compositions of 49 different rare-earth ores. 39 ref. (B general, EG-g)

208-B. (Book) **North American Combustion Handbook.** 322 pages. North American Mfg. Co., 4455 East 71st St., Cleveland 5, Ohio. $2.00

A basic reference on industrial heating with liquid and gas fuels. Theory of combustion. Heat transfer and fluid-flow calculations. Equipment selection and operations. (B18)

209-B. (Book) **Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources.** 303 pages. 1951. Department of Economic Affairs, United Nations, New York City.

Series of papers and accompanying discussion, under the broad headings: Mineral supplies and their measurement; the outlook for future discovery; increasing mineral resources by discovery; conservation in mining and milling; conservation in manufacture; conservation by corrosion control; conservation by substitution; and inorganic fertilizers in conservation. Selected papers are separately abstracted. (B general)

210-B. Operation of the Creighton Mill of the International Nickel Company of Canada, Limited. *Canadian Mining and Metallurgical Bulletin*, v. 45, May 1952, p. 253-259; *Transactions of the Canadian Institute of Mining and Metallurgy*, v. 55, 1952, p. 163-169.

Construction and operation of new mill for low-grade Ni ore. Crushing, grinding, flotation, tailings disposal, and other features. Tables, diagrams, and illustrations. (B13, B14, Ni)

211-B. Iron Ore Supply: Present and Future. W. M. Goodwin. *Canadian Mining and Metallurgical Bulletin,* v. 45, May 1952, p. 267-270; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 55, 1952, p. 177-180.

A survey, especially for Canada. (B10, Fe)

212-B. Western Coking Coal Resources. T. G. Ewart. *Canadian Mining and Metallurgical Bulletin,* v. 45, May 1952, p. 264-265; disc., p. 266; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 55, 1952, p. 174-175; disc., p. 176.

A survey for both the U. S. and Canada. (B10)

213-B. Iron Ore: Brazil Pecks Away at Vast Blue Lode. W. V. Packard. *Iron Age,* v. 169, May 15, 1952, p. 67-69.

Current status in the development of the Caué Peak hematite deposits in central Minas Gerais which run 69% Fe and hold up to 25% of world's ore reserves. Area now ships 1.5 million tons annually. (B10, Fe)

214-B. Surface Oxidation of Galena in Relation to Its Flotation as Revealed by Electron Diffraction. Hitosi Hagihara. *Journal of Physical Chemistry,* v. 56, May 1952, p. 610-615.

Initial oxidation of galena surfaces was studied in air, in an enclosed atmosphere in galena powder, in a vacuum furnace, in water, and during dry and wet grinding. Electron diffraction examination of the oxidized faces showed that the lowest oxidation product is, in all cases, $PbSO_4$. In no instance were crystalline carbonate, hydroxide or the lower sulfoxides observed. Orientation relations and crystal growth. Graph and electron-diffraction patterns. 35 ref. (B14, Pb)

215-B. Mono- and Multilayer Adsorption of Aqueous Xanthate on Galena Surfaces. Hitosi Hagihara. *Journal of Physical Chemistry,* v. 56, May 1952, p. 616-621.

Action of aqueous xanthate on galena surfaces was studied by electron diffraction. Its primary function on both fresh and slightly oxidized faces lies in formation of minute monomolecular patches adsorbed on the galena lattice. Suggests that the monolayer is composed of xanthic acid molecules adsorbed with their polar heads attached to Pb atoms of the galena lattice. The layer is unstable in air. Schematic drawings and electron diffraction patterns. 21 ref. (B14, P13, Pb)

216-B. Collector-Depressant Equilibria in Flotation. I. Inorganic Depressants For Metal Sulfides. II. Depressant Action of Tannic Acid and Quebracho. George A. Last and Melvin A. Cook. *Journal of Physical Chemistry,* v. 56, May 1952, p. 637-648.

Part I: The "bubble pick up" method of Cooke and Digre was employed to obtain comprehensive equilibrium data for the system potassium n-amylxanthate-sodium sulfite—galena at 25° C. Mechanism developed was found to give a complete and self-consistent correlation of experimental results of this study together with results for 16 other similar systems studied by Wark. Part II: The systems galena—n-amyl xanthate—tannic acid and galena—n-amyl xanthate—quebracho were investigated, and the data interpreted by the single-site model for hydrolytic (free-acid) collector-depressant adsorption. Tables, graphs and 24 ref. (B14)

217-B. The Third Theory of Comminution. Fred C. Bond. *Mining Engineering,* v. 4, May 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 193, 1952, p. 484-494.

Development, proof, and application of theory which should eliminate the objections to the two old theories and serve as a practical unifying principle for comminution in all size ranges. 11 ref. (B13)

218-B. Deleading Zinc Concentrate at the Parral and Santa Barbara Mills. C. L. Boeke and G. G. Gunther. *Mining Engineering,* v. 4, May 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 193, 1952, p. 495-498.

Zinc deleading processes at above mills of Cia. Minera Asarco, S.A., Chihuahua, Mexico, are described separately to provide a basis for comparison. Emphasis is on flotation procedures. (B14, Zn)

219-B. Screened Ore Used for Fine Grinding at Lake Shore Mines. Bunting S. Crocker. *Mining Engineering,* v. 4, May 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 193, 1952, p. 499-508.

Method of substituting screened rock for steel grinding balls used by Lake Shore Mines, Ltd., Kirkland Lake, Ont., Canada. Results of various tests; reasons for changeover. Tabular data, graphs, and diagrams. (B13)

220-B. Iron Ore in the Sahara. *Times Review of Industry,* v. 6, May 1952, p. 88.

A group representing French, Canadian and British mining and metallurgical interests has recently formed a company to exploit rich and extensive iron-ore deposits on the western edge of the Sahara Desert. The ore lies in the vicinity of Fort Gouraud, in Mauritania. (B10, Fe)

221-B. Utilization of Manganese in Special Steels. (In English.) *Aciers fins et Speciaux Francais,* Mar. 1952, p. 33-38.

French practice in the above, details of compositions for different purposes, also properties in a general way. (B22, AY, SS, Mn)

222-B. Manufacture and Utilization of Crush-Resistant Pumice Slags. (In German.) Rudolf Kley. *Stahl und Eisen,* v. 72, Apr. 1952, p. 500-502.

Development of pumice-slag manufacture. Properties of pumice-slag and advantages of the types having strong grains. Possibilities of application. Proposals for increasing its sale. Sulfur in blast-furnace slag and its significance. (B21, D1, ST)

223-B. Theory of Grinding of Minerals. III. Separation of Particles of Coarsely Ground Products Into Two Fractions. (In Russian.) B. M. Zviagin, O. M. Todes, and A. Z. Iurovskii. *Izvestiia Akademii Nauk SSSR,* Section of Technical Sciences, Dec. 1951, p. 1825-1840.

Mathematical analysis plus graphical interpretation. (B13)

224-B. Computation of Mill Recovery. M. P. Legoux. *Bulletin of the Institution of Mining and Metallurgy,* May 1952; *Transactions,* v. 61, pt. 8, 1951-52, p. 410-414.

Discussion of above paper by C. C. Dell. (Dec. 1951 issue.) See item 45-B, 1952. (B14)

225-B. Tests To Determine a Method of Treatment of a Complex Gold Ore From Tarcoola, South Australia. *Commonwealth Scientific and Industrial Research Organization and Kalgoorlie School of Mines,* Ore Dressing Investigation Report 461, July 4, 1951, 25 pages.

Details of test results on three samples are tabulated and conclusions summarized. Flotation, gravity concentration, amalgamation, and cyanidation were employed. Recovery of Au is emphasized. Recovery of Pb or Cu is of doubtful economic merit. (B14, C24, C29, Au)

226-B. Sinter Production Tied to Plant Design. Martin L. Cover. *Iron Age,* v. 169, June 5, 1952, p. 145-149.

Discusses conditions for maximum production of highest quality sinter, based in part on analysis of sections of the sinter bed of a 6-windbox machine. (B16, Fe)

227-B. Refractories Symposium. *Iron and Steel Engineer,* v. 29, May 1952, p. 79-85; disc., p. 85-87.

"Experiences With Castable and Rammed Refractories", J. E. Deegan; "Application of Rammed Castable Refractories in Steel Mills", Robert R. Fayles; "Experiences With Refractory Concrete", William N. Horko; "Advantages of Rammed and Cast Refractories for Steel Plant Use", R. E. Wolfensperger. (B19, ST)

228-B. On the Emulsification of the Flotation Reagents. (In English.) Tadashi Oyama and Sakae Tanaka. *Japan Science Review,* v. 2, Apr. 1951, p. 87-88.

Previously abstracted from *Science Reports of the Research Institutes, Tohoku University;* see item 81-B, 1952. (B14)

229-B. Thermodynamic Calculation of Slag Equilibria. H. Flood and K. Grjotheim. *Journal of the Iron and Steel Institute,* v. 171, May 1952, p. 64-70.

The equilibrium constant of reactions in molten slags, expressed in terms of ion concentrations, is shown to be frequently influenced by concentrations that do not enter into the formal equilibrium equation. A simple thermodynamic relation is derived between equilibrium constant and concentrations of ions not entering into the equilibrium equation. 10 ref. (B21, P12)

230-B. The Agglomeration of Taconite Concentrate. Marvin A. Kunde. *Mines Magazine,* v. 42, May 1952, p. 39-42.

With special reference to Northern Minnesota taconite. The current status of pelletizing, sintering, nodulizing, and briquetting. (B16, B17, Fe)

231-B. Pneumatic Flotation Equipment. Frank H. Slade. *Mining Journal,* v. 238, May 23, 1952, p. 530-532.

Low-pressure air provides for maximum bubble attachment in modern flotation equipment used in the treatment of metallic ores, nonmetallic minerals and many other materials. Operation of various types of machines in current use. Diagrams. (B14)

232-B. Centrifugal Separation at a Fluid Boundary. D. Tedman. *Mining Magazine,* v. 86, May 1952, p. 274-276.

Discovery which led to the development of a continuous separating

machine for ore fractions. Laboratory apparatus is diagrammed. Separation of galena and sphalerite. (B14)

233-B. The Tsumeb Story. Part II. Tsumeb Mill Uses Five Flotation Circuits For Copper, Lead, Zinc Oxide and Sulphide Ores. J. N. Ong. *Mining World,* v. 14, June 1952, p. 34-39.

Details of crushing, grinding, and concentration flowsheets, equipment, and procedures of above mill, located in Southwest Africa. Products are Cu, Pb, and Zn concentrates. (B14, Cu, Pb, Zn)

234-B. Factors Affecting Flotation. Part II. (Concluded.) H. J. Gisler. *Pit and Quarry,* v. 44, Apr. 1952, p. 109-112.

Methods of introducing air, kind of gas used to form bubbles, removal of concentrates, types of flotation machines, and applications to metals and nonmetals. (B14)

235-B. Blast Furnace Practice. X. Beneficiation of Raw Materials. Charles E. Agnew. *Steel,* v. 130, May 19, 1952, p. 106, 108, 111, 114, 116, 118, 121-122, 124, 127.

Treating natural iron ores, ore concentrates, and flue dust. Sintering, nodulizing, briquetting, and pelletizing. Fuel beneficiation. (To be continued.) (B16, B17, Fe)

236-B. Treatment Tests of Scheelite Ores and Tailings. A. L. Engel. *U. S. Bureau of Mines,* Report of Investigations 4867, Apr. 1952, 11 pages.

A compilation of results of preliminary tests on scheelite (tungsten) ores and tailings. These investigations were made to assist in establishing satisfactory treatment methods for small-scale concentrator operations, or to indicate a method for conserving previously lost mineral values in old tailings. (B14, W)

237-B. Selective Flotation of Metals and Minerals. (In German.) J. H. Schulman and T. D. Smith. *Kolloid Zeitschrift,* v. 126, Apr. 1952, p. 20-32; disc., p. 32-35.

Fundamental principles. Experimental methods of studying different metals and minerals under different conditions. Diagrams, graphs, and tables. 13 ref. (B14)

238-B. Secondary Utilization of Excess Blast Furnace Gas in Metallurgical Plants. (In Russian.) S. I. Moiseevich. *Za Ekonomiiu Topliva,* v. 9, Mar. 1952, p. 4-8.

Use of buffer boiler installations which will automatically adjust the consumption of blast-furnace gas to pressure in the gas system, thus preventing some of the waste that occurs due to variations of its production and use. (B18)

239-B. High Quality Sinter From Lean Iron Ores. D. W. Gillings. *Blast Furnace and Steel Plant,* v. 40, June 1952, p. 663-668, 670-671.

Reviews recent technical advances in the sintering of British ores; background and techniques of individual researches. Tables, graphs, and photographs. (B16, Fe)

240-B. The Upgrading of Minerals, With Special Reference to Coal. E. M. Myers. *Chemistry & Industry,* Mar. 29, 1952, p. 278-286.

Includes brief discussion of treatment methods for a variety of metal ores. History, gravity methods, and froth flotation for coal upgrading. Diagrams. (B14, B18)

241-B. How to Measure Retention Time in Flotation Machines. T. M. Morris. *Engineering and Mining Journal,* v. 153, June 1952, p. 91.

Procedure used at London mill of Tennessee Copper Co. to compare retention times in the bulk rougher and scavenger circuits, and to compare average retention time of water and solids in the bulk rougher circuit. (B14)

242-B. Metal Economics. I. Primary Resources of Ferrous and Non-Ferrous Metals. A. J. Murphy. **The World Supply of Non-Ferrous Metals, Including the Light Metals.** R. Lewis Stubbs. **Metals as Natural Resources.** S. Zuckerman. **World Demand and Resources of Iron Ore.** T. P. Colclough. *Journal of the American Society of Naval Engineers,* v. 64, May 1952, p. 259-280. Reprinted from *Journal of the Institute of Metals;* see item 74-B, 1952.

(B10, A4)

243-B. Impact Crushing for Reduction of Hard-Abrasive Ores. W. W. West. *Mining Engineering,* v. 4, June 1952, p. 563-564.

Theory and its relation to attrition crushing. Design and operation of impactors. (B13)

244-B. Jacksonville Plant Produces Titanium From Beach Deposit. J. C. Detweiler. *Mining Engineering,* v. 4, June 1952, p. 560-562.

Operations at the Jacksonville plant of Humphreys Gold Corp., which recovers rutile, ilmenite, zircon, and monazite from an ancient beach deposit containing about 2.5% of these minerals in combination. (B14, Ti)

245-B. A Review of Mineral Dressing. F. B. Michell. *Mining Journal,* May 1952, p. 75, 77, 79, 81, 83.

Review for 1951 of crushing; grinding; screening; classification;

heavy media separation; gravity concentration; washing and scrubbing; flotation; electrostatic separation; and hydrometallurgy. (B general)

246-B. Progress of Mining in the United States. *Mining Journal,* May 1952, p. 89-91, 93.

Concerns the year 1951 and includes brief notes on ore dressing, and hydro and extractive metallurgy. (B12, B14, C general)

247-B. Factors Affecting Flotation. Part II. (Concluded.) H. J. Gisler. *Pit and Quarry,* v. 44, Apr. 1952, p. 109-112.

Methods of introducing air, kind of gas used to form bubbles, removal of concentrates, types of flotation machines, and applications to metals and nonmetals.

248-B. Natural Draft and Forced Draft. (In French.) J. E. Lafon. *Metallurgie et la Construction Méchanique,* v. 84, Mar. 1952, p. 175, 177, 179, 181; Apr. 1952, p. 251, 253, 255.

Compares the two systems as applied to industrial furnaces, especially the regenerative type. Schematic diagrams illustrate principles. (To be continued.) (B18)

249-B. (Book) **Manual of ASTM Standards on Refractory Materials.** Rev. ed. 306 pages. 1952. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Cloth, $3.65; paper $3.00.

Supersedes 1948 ed. Brings together all of the ASTM standard and tentative specifications, classifications, methods, and definitions pertaining to refractories. Includes surveys of refractory service conditions in the malleable iron industry and lead industry; and methods of test for modulus of rupture and for permanent linear change on firing of castable refractories. Test methods cover fireclay refractory brick; mortars and fireclay plastic and castable refractories; and insulating fire brick. (B19)

250-B. Basic Minerals: Shortages Eased by Expanding Supplies. Charles White Merrill. *Industrial and Engineering Chemistry,* v. 44, June 1952, p. 1223-1228.

Economic analysis and statistical presentation. (B10, A4)

251-B. Basic Minerals: Foreign Sources Loom Larger in U. S. Supply. Elmer W. Pehrson. *Industrial and Engineering Chemistry,* v. 44, June 1952, p. 1232-1234.

A survey. Graphs. (B10)

252-B. Copper: Michigan Mines Stage Comeback. R. D. Raddant. *Iron Age,* v. 169, June 19, 1952, p. 94-95.

Current status of Calumet & Hecla mines and of the White Pine mine development. (B12, B10, Cu)

253-B. A Cell for High Temperature Electrochemical Studies of Molten Salts and Slags. M. T. Simnad, W. E. Dennis, and G. Derge. *Review of Scientific Instruments,* v. 23, May 1952, p. 248-249.

Cell designed to measure accurately conductivity, transference numbers, and ionic mobility of the salts and slags. Diagram. (B21)

254-B. Electrolytic Manganese Tests in Cooperation With Industry. Frederick Sillers, Jr. *U. S. Bureau of Mines,* Report of Investigations 4861, May 1952, 81 pages.

To prove that electrolytic manganese from our low-grade domestic ores could be substituted satisfactorily for ferromanganese made from high-grade foreign ores, an extensive series of tests was conducted in cooperation with industry, in which electrolytic manganese produced by the Bureau of Mines at its Boulder City, Nev., Station was substituted for the ordinary ferro grades in the production of ferrous and nonferrous metals and alloys and welding-rod coatings. For some purposes electrolytic Mn was shown to be superior to other grades because of its high purity. Results of tests made in cooperation with industry are tabulated and discussed. 31 ref. (B22, Mn, ST)

255-B. Concentration of Oxide Manganese Ores From the Vicinity of Cleveland, Bannock County, Idaho. K. C. Vincent and D. T. Holmes. *U. S. Bureau of Mines,* Report of Investigations 4884, May 1952, 14 pages.

This ore proved readily amenable to heavy-medium separation to recover approximately 45% of the total Mn as a +51%-Mn product. As the product was high in MnO_2 content and free from usual impurities, it might be acceptable as battery filler or for other special uses. Combined sink-and-float and tabling treatment recovered 51.8% of the Mn in a +48% product, marketable directly without sintering. Heavy-medium separation, supplemented by flotation of calcite from reground coarse reject and untreated undersize, recovered 70.1% of the total Mn in a combined product that, when sintered, assayed over 48% Mn. (B14, Mn)

256-B. Experimental Treatment of Barite Ores From Montgomery County, Ark., and Morgan County, Mo. D. W. Frommer and M. M. Fine. *U. S.*

Bureau of Mines, Report of Investigations 4881, May 1952, 11 pages.

Laboratory mineral-dressing investigations show that above ores are potential sources of barite and zinc. Fine grinding and froth flotation yielded drilling-grade barite from the former and chemical-grade barite and Zn concentrates from the latter. (B13, B14, Zn)

257-B. (English.) The Conductivity of Some Molten Silicates on Fayalite Basis. G. Björling. *Kungl. Tekniska Högskolans Handlingar* (Transactions of the Royal Institute of Technology), No. 59, 1952, 29 pages.

Importance of slag conductivities to electrochemical extraction of metals and ores. Conductivity of molten fayalite with different additions was measured from 1300-1400° C. to the temperature of initiation of crystallization. Additions were dicalcium silicate; monocalcium silicate (wollastonite); dizinc silicate (willemite); dimanganese silicate (tephroite); oxides of Ca, Al, Mg and Zn; magnetite; sulfides of heavy metals; and fluorspar. A theory is developed that only mobile cations can participate in the conduction, while the big anions lay practically immobile in the melt. 26 ref. (B21)

258-B. The Trend of Mineral Dressing in North America. *Bulletin of the Institution of Mining and Metallurgy,* June 1952; *Transactions,* v. 61, p. 9, 1951-52, p. 444-459.

Discussion of paper by M. G. Fleming. (April 1952 issue.) (B14)

259-B. Theory and Practice of Roasting Sulphide Concentrates With Special Reference to Canadian Gold Ores and Concentrates. L. E. Djingheuzian. *Canadian Mining and Metallurgical Bulletin,* v. 45, June 1952, p. 352-362; disc., p. 362-364; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 55, p. 238-248; disc., p. 248-250.

Reviews some Canadian papers on roasting practices. Analyzes the mechanism of roasting. (B15, Au)

260-B. Heavy-Media Separation; a Modern Mineral Dressing Process. S. A. Falconer. *Foote Prints,* v. 24, no. 1, 1952, p. 9-17.

(B14)

261-B. Fuel and Metal. R. J. Sarjant. *Foundry Trade Journal,* v. 92, June 12, 1952, p. 619-628.

Broad treatment of ferrous production and melting operations, stressing fuel and fuel requirements. Coke in metal melting; coke shortages; contrast between cupola and blast-furnace requirements; constitution of coal; correlation of carbonizing conditions and coke properties; impact testing of coke; cupola flow and reactions; coke reactivity; the hot-blast cupola; and oxygen enrichment. 33 ref.

(B18, D general, Fe, CI, ST)

262-B. Distribution of Manganese and Oxygen Between Molten Iron and FeO-MnO-SiO_2 Slags. H. B. Bell, A. B. Murad, and P. T. Carter. *Journal of Metals,* v. 4, July 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 718-722.

The above distribution was determined and used to calculate activities of MnO and SiO_2 in MnO-SiO_2 slags. Graphs and diagrams. 14 ref. (B21, D general)

263-B. Thermodynamics of Iron-Silicate Slags: Slags Saturated With Solid Silica. E. J. Michal and R. Schuhmann, Jr. *Journal of Metals,* v. 4, July 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 723-728.

Experimental measurements are reported for the O_2 pressures of iron silicate slags in equilibrium with solid silica. Such slags have practical importance in copper smelting, in acid steelmaking, and in accounting for the service behavior of silica refractories. From the data, activity vs. composition relationships are calculated for O_2, FeO, and Fe. Tables and graphs.

(B21, P12, Cu, ST)

264-B. Rhude Wet Grinds Ferrosilicon for the Iron Range HMS Plants. *Mining World,* v. 14, July 1952, p. 41-43.

Rhude Media Co., Marble, Minn. wet grinds ferrosilicon and delivers it as filter cake to heavy-media separation plants on the Iron Ranges. (B13, Fe)

265-B. Hanna Iron Ore Co. Uses Heated Screens to Successfully Dry-Screen Wet Sticky Ores. Stephen E. Erickson and Masao Tanamachi. *Mining World,* v. 14, July 1952, p. 47, 49.

Equipment and procedures.

(B13, Fe)

266-B. Iron Ore Conditioning and Sintering. *Skillings' Mining Review,* v. 41, July 5, 1952, p. 1, 4.

Various iron ores for blast-furnace use, each of fairly uniform composition, are crushed, screened, and blended to a uniform excess acidity in the Central Ore Conditioning and Sintering Plant of Tennessee Coal & Iron Div., U. S. Steel Co., near Birmingham, Ala. Equipment and procedures. (B13, B16, Fe)

267-B. (German.) **Flotation of Lead-Zinc Ores With High Kaolin Content.** Werner Gründer and Bela Bunji. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 5, May 1952, p. 182-185.

Laboratory experiments on the above. Application of results of these experiments to the flotation process. Results of large-scale experiments, justifying certain changes in procedure. Diagrams. (B14, Pb, Zn)

268-B. (Russian.) **Electrocapillary Phenomena at High Temperatures.** O. A. Esin, Iu. P. Nikitin, and S. I. Popel. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Mar. 21, 1952, p. 431-434.

Experiments were made on metal-slag systems, involving a complex Al-Ca-Na silicate and Fe-C alloys containing 2.5, 3.0, and 4.0% C. Equipment and charted data. (B21, ST)

269-B. Work on Taconite Now Heads Toward Commercial Goal. A. H. Hubbell. *Engineering and Mining Journal,* v. 153, July 1952, p. 72-75.

Indicates that 1952 should see two more preliminary or experimental plants in operation with construction of two "ultimate" plants begun. Annual production should be at least 10,000,000 tons in 1960. (B16, A4, Fe)

270-B. How the Hollinger Mill Solves the Dust Control Problem. P. J. Dunlop. *Engineering and Mining Journal,* v. 153, July 1952, p. 79-82.

Dust-control flowsheet superimposed on crushing-plant flowsheet, at Hollinger Consolidated Gold Mines, Ltd., Timmins, Ont., Canada. (B13, A5, Au)

271-B. Separation of Thorium From Monazite. S. R. Sivarajan. *Journal of the Indian Institute of Science,* v. 34, sec. A, Jan. 1952, p. 1-3.

Pure Travancore monazite freed from zircon, rutile, and siliceous impurities was used in the investigations. Results are charted. (B14, Th)

272-B. Beneficiation of Low-Grade Chrome Ore From Dodkanya (Mysore). P. I. A. Narayanan and G. P. Mathur. *Journal of Scientific & Industrial Research,* v. 11A, May 1952, p. 202-204.

Gravity methods of concentration were employed using the jig, Wilfley table, and Humphrey's spiral. Data tabulated. (B14, Cr)

273-B. Beneficiation of Low-Grade Soft Chrome Ore From Kittaburu, Singhbhum District, Bihar. P. I. A. Narayanan and S. K. Banerjee. *Journal of Scientific & Industrial Research,* v. 11A, May 1952, p. 205-206.

Jigging, tabling, and Humphrey's spiral tests were employed. Data tabulated. (B14, Cr)

274-B. Beneficiation of Low-Grade Hard Chrome Ore From Kittaburu, Singhbhum District, Bihar. P. I. A. Narayanan and M. C. Sen. *Journal of Scientific & Industrial Research,* v. 11A, May 1952, p. 207-209.

Jigging, tabling, Humphrey's spiral, and flotation tests were employed. (B14, Cr)

275-B. Mining and Milling at Amalgamated Banket Areas. E. J. Perry. *Mine & Quarry Engineering,* v. 18, July 1952, p. 218-222.

Operations at gold-producing company in the Gold Coast Colony. Crushing, ball milling, and cyanide treatment. Flowsheet. (B12, B13, B14. Au)

276-B. Newfoundland Explores Its Mineral Wealth. George G. Thomas. *Mining Engineering,* v. 4, July 1952, p. 672-673.

Fast-growing interest in the mineral wealth and mineral mining of Newfoundland. (B10)

277-B. Liberia—the Bomi Hills Development. *Mining Engineering,* v. 4, July 1952, p. 674-675.

Brief discussion of the high-quality iron ore of the Bomi Hills of Liberia. (B10, Fe)

278-B. Adsorption of Sodium Ion on Quartz. A. M. Gaudin, H. R. Spedden, and P. A. Laxen. *Mining Engineering,* v. 4, July 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 193, 1952, p. 693-696.

Results of experiments in the development of flotation theory. Tables and graphs. 18 ref. (B14)

279-B. The Effect of Certain Starches on Quartz and Hematite Suspensions. Strathmore R. B. Cooke, Norman F. Schulz, and Emert W. Lindroos. *Mining Engineering,* v. 4, July 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 193, 1952, p. 697-698.

Test materials, starch adsorption on mineral surfaces, flocculation, and flotation. (B14)

280-B. Experimental Furnace Recovers Manganese From Slag. R. C. Buehl. *Steel Equipment & Maintenance News,* v. 5, June 1952, p. 24-25.

Previously abstracted from *Iron Age.* See item 107-B, 1952. (B21, A8, Mn, Fe-n)

281-B. (Book) **Symposium on Bulk Sampling.** 65 pages. 1952. American Society for Testing Materials. 1916 Race St., Philadelphia 3, Pa. (Special

Technical Publication 114.)

Introduction, by W. Edwards Deming, plus six papers on specific aspects. Includes two on coal sampling and a joint discussion on this topic. (B11)

282-B. The Rod Mill in the Sullivan Flow. H. R. Banks. *Canadian Mining and Metallurgical Bulletin,* v. 45, July 1952, p. 397-403; disc., p. 403; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 55, 1952, p. 255-261, disc., p. 261.

Summarizes work of the rod mill through the first 5,000,000 tons and shows that the wear is definitely below normal. Consumption of steel, power, and other operating data. Observations on the principles involved in comminution. Material is galena. Photographs and tables. (B13, Pb)

283-B. Sulphur Elimination; The Use of Sulphur as Fuel in the Sintering of Iron Ores. R. A. Elliot. *Canadian Mining Journal,* v. 73, July 1952, p. 51-56.

History, experimental apparatus and procedure, and results. Tables and illustrations. (B16, Fe)

284-B. Refractories for 4000° F. and Higher. Gordon R. Finlay. *Chemistry in Canada,* v. 4, Mar. 1952, p. 41-43.

Reviews the field of special refractories and includes considerable new data. Possible applications of the refractory carbides, nitrides, and borides include crucibles, jet nozzles, refractory liners, and arc or electrolytic electrodes. (B19)

285-B. U. S. Steel Fuels 60,000-Kw Unit With Blast Furnace Gas. W. P. Palmer. *Electrical World,* v. 138, July 28, 1952, p. 81-83.

New unit at U. S. Steel Co.'s South Works is largest ever designed for burning blast-furnace gas. It operates on steam at 850 psi., 900° F. Diagrams and illustrations. (B18)

286-B. The Chlorination of Olivine Ore. H. H. Greenfield and R. W. Moulton. *Trend in Engineering at the University of Washington,* v. 4, July 1952, p. 22-24, 28.

Equipment, procedures, and results of experimental study of the process—a step in the possible recovery of Mg from olivine. (B14, Mg)

287-B. Sunshine Lardeau; Newest B. C. Base-Metal Producer. R. C. Glen. *Western Miner,* v. 25, July 1952, p. 44-46.

New Pb-Zn concentrator. Au and Ag are also produced. Equipment and ore beneficiation. (B14, Pb, Zn, Au, Ag)

288-B. (French.) Measurement of the Viscosity of Synthetic Slags With a High Ferrous Oxide Content. Parts I and II. G. Urbain. *Journal de Chimie Physique et de Physico-Chimie Biologique,* v. 49, May 1952, p. 308-322.

Proposes a new method for measurements on above slags, using optical pyrometry. Experimental results. Data are tabulated and charted. 75 ref. (B21)

289-B. (French.) The Italian Aluminum Industry. Part One. Minerals. Part Two. The Metal. G. A. Baudart. *Revue de l'Aluminium,* v. 29, May 1952, p. 171-173; June 1952, p. 217-219.

Includes map and production data. (B10, Al)

290-B. (German.) Experiments on the Beneficiability of the Antimony Ores of Oberböhmsdorf. Eugen von Szantho. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 5, June 1952, p. 234-236.

Flotation experiments show that above ores can be easily floated to produce concentrates containing 60% Sb with better than 80% extraction. (B14, Sb)

291-B. Antimony Deposits of Tuscany. G. Dessau. *Economic Geology and the Bulletin of the Society of Economic Geologists,* v. 47, June-July, 1952, p. 397-413.

Three deposits, Poggio Fuoco, Tafone, and Montauto are described in detail; others are covered more briefly. Tables and maps. 12 ref. (B10, Sb)

292-B. Satellite Europe's Mineral Position. John M. Warde. *Engineering and Mining Journal,* v. 153, Aug. 1952, p. 84-89.

Mineral production in the Russian satellite countries of Europe: East Germany, East Austria, Poland, Czechoslovakia, Romania, Bulgaria, and Albania. Includes map of mineral deposits and iron and steel centers. (B10)

293-B. Can the U. S. Use Its Low-Grade Domestic Chrome Ore? H. A. Doerner. *Engineering and Mining Journal,* v. 153, Aug. 1952, p. 90-92.

Surveys U. S. Cr resources. Methods of upgrading, and the question of whether upgrading is necessary. An abstract of a report by D. H. Ruhnke of Republic Steel Corp. indicates that lower grade ferrochromium may be satisfactory for steelmaking. (B22, D general, Fe-n, Cr)

294-B. Nchanga's New Copper Leach Plant. *Engineering and Mining Journal,* v. 153, Aug. 1952, p. 93. (From report by H. L. Talbot in *Optima,* a quarterly review published by Anglo American Corp.)

Includes flow diagram for above South African plant. Crushing, grinding, classification, leaching,

thickening, ball milling, flotation, electrolysis, and casting. (B13, B14, Cu)

295-B. Cupola Coke: With Particular Reference to High-Ash Coke. A. G. L. Lewis. *Foundry Trade Journal,* v. 93, July 24, 1952, p. 89-93.

Cupola coke in Southern Africa contains more than 0.15% ash, which is about double the ash content of cokes produced in the Northern Hemisphere. A similar position prevails in Australia and India. The ash content of American and European coke tends to rise. Attention is also drawn to a world-wide tendency—fluctuations in coke quality. The effect of high-ash coke and variations in coke quality on the production of iron castings from cupola melts and methods of dealing with these effects. (B18, E10)

296-B. Considerations on the Effect of Ash and Clinker in the Iron and Steel Industry. Neil H. Turner. *Journal of the Institute of Fuel,* v. 25, July 1952, p. 187-188.

Effect in blast-furnace coke, for producer-gas production, and in coal for firing steam locomotives and cranes. (B18, ST)

297-B. Titanium—Its Occurrence and Uses. Graham Oldham. *Mining Journal,* v. 239, July 18, 1952, p. 68-69. (B10, T general, Ti)

298-B. Non-Ferrous Metal Resources in North Wales. S. Dawson Ware. *Mining Magazine,* v. 88, July 1952, p. 15-20.

A survey. (B10, EG-a)

299-B. India Ups Manganese Production to Supply "Free World" Market. *Mining World,* v. 14, Aug. 1952, p. 34-37.

Economic status and supply of Mn in India. Geology of the deposits, geographical distribution, grades of ore, prospecting and mining, beneficiation and marketing and export. Tables, photographs, and map. (B10, Mn)

300-B. Specular Hematite Pilot Plant. *Mining World,* v. 14, Aug. 1952, p. 51.

M. A. Hanna Co., Groveland, Mich., pilot plant for Menominee Range ore. Equipment and methods include Humphrey's spirals, magnetic separation, and flotation. (B14, Fe)

301-B. The Inferno Tamers. Richard Cheney. *Steelways,* v. 8, July 1952, p. 21-24.

Refractories and their use for confining molten metals and glass. Manufacture and testing. (B19)

302-B. Corrosion of Refractory Materials. *Blast Furnace and Steel Plant,* v. 40, Aug. 1952, p. 921-925, 927. (Translated by Helen Towers from *Berichte der Deutschen Keramischen Gesellschaft und des Vereins Deutscher Emailfachleute,* v. 29, 1952)

Chemical and physical factors, critical review of work done during 1940-1950. Scope is confined to work done in Great Britain with occasional references to American literature. Extensive reference to service in metallurgical furnaces. 26 ref. (B19)

303-B. Nitride Crucibles. *Metal Progress,* v. 62, Aug. 1952, p. 160, 162. (Condensed from "Preparation of Crucibles From Nitrides", L. S. Foster, *U. S. Atomic Energy Commission,* AECD-2942, July 1945.)

Selection of material, with greatest emphasis on Ti and Zr nitrides. Production of crucibles. (B19)

304-B. Spirals Recover Heavy Mineral By-Product—Kings Mountain, N. C. W. R. Hudspeth. *Mining Engineering,* v. 4, Aug. 1952, p. 767.

Foote Mineral Co.'s method for recovering cassiterite and columbite chiefly, while producing spodumene concentrate. (B14, Sn, Cb)

305-B. High-Efficiency Desliming by Use of Hydraulic Water Additions to the Liquid-Solid Cyclone. D. A. Dahlstrom. *Mining Engineering,* v. 4, Aug. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 193, 1952, p. 788-793.

Feasibility of hydraulic water cyclones as fine-size classifiers. Desliming coefficients of 0.3 or less are obtainable and the operation can be done in one piece of equipment. Tables. 10 ref. (B14)

306-B. Measurement and Evaluation of the Rate of Flotation as a Function of Particle Size. T. M. Morris. *Mining Engineering,* v. 4, Aug. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 193, 1952, p. 794-798.

Experimental procedure included laboratory batch tests on cleaned concentrate Cu ore, Cu particles, and plant classifier overflow; and tests on samples from a 10-cell plant flotation machine floating pyrite. The two different types of actions taking place. Tables and graphs. (B14, Cu)

307-B. (Book) **Sources of Iron Ore in Asia.** Joseph F. Harrington and Benjamin M. Page. 176 pages. 1952. Office of Technical Services, U. S. Dept. of Commerce, Washington, D. C. (Report 154, Natural Resources Division, Economic and Scientific Section, General Headquarters, Supreme Commander for the Allied Powers, Tokyo.)

A regional picture of the known, important iron-ore deposits in East Asia. Data confined to the most essential factors necessary to determine the importance and place of a deposit in the regional economic pattern. Quantity and quality of ore, geology, mining methods, metallurgy, transportation, and history. Maps, charts, and tables. (B10, Fe)

308-B. Study in Flotation Frothing —Surface Tension: Air-Solution. S. A. Wrobel. *Bulletin of The Institution of Mining and Metallurgy,* Aug. 1952; *Transactions,* v. 61, 1951-1952, p. 505-517.

Apparatus and technique for determining surface tensions of frother solutions. Variation in surface tension of pine oil with time was measured and results are discussed. The term "air-bell carrying strength" as a specific characteristic of flotation frothers is introduced and defined. 11 ref. (B14)

309-B. Industrial Uses of Refractories, Part I. *Ceramics,* v. 4, July 1952, p. 213-220.

Emphasis on metallurgical uses, giving details of furnace design for blast furnaces, openhearths, bessemers, electric furnaces, hot-metal mixers, ladles and soaking pits. (B19, D general)

310-B. Electrostatic Concentration of Pyrochlore From Tororo, Uganda, British East Africa. *Commonwealth Scientific and Industrial Research Organization and Mining Department, University of Melbourne,* Investigation 400, Aug. 30, 1951, 11 pages.

Magnetic and electrostatic tests on washed and demagnetized earth were conducted. The material consisted mostly of apatite, and usually contained traces of columbium mineral, pyrochlore, zircon, baddeleyite, tremolite, and a certain quantity of quartz. (B14, Cb, Ta)

311-B. Investigation of Churn Drill Sludges for Western Mining Corporation, Ltd. *Commonwealth Scientific and Industrial Research Organization and Kalgoorlie School of Mines,* Report 509, Oct. 10, 1951, 6 pages.

Accurately sampling churn-drill sludges for gold assay is possible by tabling, amalgamating the concentrate, and assaying the various products. Tables. (B11, Au)

312-B. Treatment of Cobalt-Nickel Ore From Bogota, Canada, New Caledonia. *Comonwealth Scientific and Industrial Research Organization and Mining Department, University of Melbourne,* Investigation 403, Oct. 23, 1951, 13 pages.

Treatment was attempted by a number of methods; flotation, tabling, and magnetic concentration were found to be ineffective. Several leaching methods were tried but only two were found to be promising. Tables and graphs. 14 ref. (B14, Co, Ni)

313-B. Concentration of a Tin Ore Containing Sulphides From the Ivy Mine, Emuford, Queensland. *Commonwealth Scientific and Industrial Research Organization and Mining Department, University of Melbourne,* Investigation 405, Nov. 7, 1951, 7 pages.

Purpose was to determine whether sulfides in above ore can be satisfactorily separated from the Sn by flotation. Results show that 95% of them can be recovered for a loss of less than 10% of the Sn. (B14, Sn)

314-B. Concentration of Copper-Lead-Zinc Ore From No. 9 Mine, Drake, N. S. W. *Commonwealth Scientific and Industrial Research Organization and Mining Department, University of Melbourne.* Investigation 406, Nov. 30, 1951, 16 pages.

Poor recovery of Au and Cu during flotation of above ore has been a problem for some time. Causes were investigated using mineragraphic examination and flotation tests with different reagents. Results are tabulated and summarized. (B14, Cu, Au, Zn)

315-B. How Gas Fuel is Speeding Rearmament. Henry M. Heyn. *Industrial Gas,* v. 31, Aug. 1952, p. 8-10, 24-26.

Major applications in metalworking include new jet pump for soaking pits; slab and billet heaters; annealing furnaces; carbon restoration; forging; aluminum production. (B18, F1, F22, J23)

316-B. New Fiber Filters, Insulates —Stands Up at 2300° F. *Iron Age,* v. 170, Aug. 21, 1952, p. 133-134.

"Fiberfrax", a new synthetic refractory fiber developed by Carborundum Co., is said to have a host of interesting possibilities in the metalworking field. (B19)

317-B. Studies in the Utilization of Non-Caking Indian Coal. Part V. Utilization of Briquettes Prepared From Tandur Coal in the Electric Smelting of Iron Ores. M. S. Iyengar. *Journal of Scientific & Industrial Research,* v. 11B, June 1952, p. 241-245.

Briquettes prepared from Tandur coal by application of the lime-tar reaction were subjected to low-temperature carbonization and their electrical conductivity and reactivity measured. Possibility of their use as reductants in electric smelting of iron ores. (B18, D5, Fe)

318-B. Refractories and American Productivity. *Refractories Journal,* July 1952, p. 308-311.

Observations on quality, application and performance of refractories, and some comparisons of British and American practice. (B19)

319-B. Crushing Practice and Theory. Part VIII. Crushing Rolls and Their Use. Brownell McGrew. *Rock Products,* v. 55, July 1952, p. 65-68, 102.

Resumption of a series of articles begun in June 1950 issue of *Rock Products* (last previous installment was June 1951). Feed size and roll diameter, the capacity formula, peripheral speeds, reduction ratio, power requirements, character of product, and applications. (To be continued.) (B13)

320-B. (French.) **Study of Slags of High Titanium Content.** W. Freundlich. *Bulletin de la Société Chimique de France,* May-June 1952, p. 655-663.

Composition, physical and chemical properties of Ti slag, particularly its reaction with H_2SO_4 and its X-ray structure. Tables, charts, and photographs. (B21, Ti)

321-B. (German.) **Internal Kinetics of Ball Mills. Impact Forces in Ball-Mill Grinding.** R. Liebold. *Technik,* v. 7, Mar. 1952, p. 113-118.

Mathematical method of computing above. Diagrams. (B13)

322-B. Size Reduction. Jullian C. Smith. *Chemical Engineering,* v. 59, Aug. 1952, p. 151-166.

Selection of crushing, grinding, and pulverizing equipment including jaw crushers, gyratory crushers, roll crushers, revolving mills, hammer mills, hogs, attrition mills, fluid-energy mills, and mills with multiple functions. Diagrams and graphs. (B13)

323-B. Flexibility in Zinc Milling. *Mining World,* v. 14, Sept. 1952, p. 57-60.

Peru Mining Co.'s Deming, N. M., flotation mill treats two types of Zn ore from company mines and custom shippers in two parallel circuits. Flowsheets and photographs. (B14, Zn)

324-B. Recovery of Precious Metals. *Times Review of Industry,* v. 6, Aug. 1952, p. 29-30.

Various methods for concentration of precious metals when found associated with base metals. Includes smelting and refining. Six flow sheets. (B general, C21, EG-c)

325-B. (German.) **Further Development of the Hammer Mill.** K. Jütte. *Brennstoff-Wärme-Kraft,* v. 4, Aug. 1952, p. 253-258.

Requirements the hammer mill must meet. Proposes simplification of construction. The problem of wear, sorting, regulation, and future possibilities of development. Charts, diagrams, and photographs. (B13)

326-B. (Russian.) **Refractometric Method for Investigating Melts.** B. V. Stark and Iu. M. Shashkov. *Doklady Akademii Nauk SSSR,* new ser., v. 85, July 1, 1952, p. 125-128.

Use of the refractometer for slag studies. Typical data are tabulated. (B21)

327-B. Corrosion of Refractory Materials. Part II. Helen Towers. *Blast Furnace and Steel Plant,* v. 40, Sept. 1952, p. 1054-1060. (Translated from *Berichte der Deutschen Keramischen Gesellschaft und des Vereins Deutscher Emailfachleute,* v. 29, 1952.)

Part II concludes a review of literature data. Includes refractories for blast furnaces, openhearth and converter furnaces, and glass tanks. 66 ref. (B19)

328-B. Fundamental Investigation of Steel Plant Refractories Problems: V. Arnulf Muan and E. F. Osborn. *Industrial Heating,* v. 19, Aug. 1952, p. 1492, 1494, 1496, 1498.

Deals with the system $2CaO \cdot SiO_2$-$CaO \cdot SiO_2$-$2CaO \cdot Al_2O_3 \cdot SiO_2$-FeO. (To be continued.
(B19, D general, ST)

329-B. Deming Mill—a Materials Handling Problem Solved. Norman Weiss and H. W. Kaanta. *Mining Engineering,* v. 4, Sept. 1952, p. 857-862.

Equipment; layout; and metallurgical control and recoveries at American Smelting & Refining Co.'s new mill, Deming, N. M. Pb, Zn, and Ag are recovered. Photographs, flowsheet, diagrams, and tables. (B13, B14, Pb, Zn, Ag)

330-B. Crushing Practice and Theory. Part IX. Special Types of Roll Crushers. Brownell McGrew. *Rock Products,* v. 55, Aug. 1952, p. 164-165, 168, 188.

Diagrams and illustrations. (To be continued.) (B13)

331-B. (French.) **Thermal Insulation of Furnaces and Ovens.** (Concluded.) J. E. Lafon. *Métallurgie et la Construction Mécanique,* v. 84, July 1952, p. 517, 519.

Practical aspect of the problem, such as linings and examples of their application. Graphs and tables show temperature gradients through layers of various insulating materials. (B19)

332-B. (Book.) **Gold Metallurgy on the Witwatersrand.** A. King, editor.

447 pages. Transvaal Chamber of Mines (Hafner Publishing Co., New York) $12.50.

How gold ores are concentrated on the "Rand" told by 18 contributors. Profusely illustrated. (B general, Au)

333-B. Liquid Cyclones. S. Hesling. *Chemical & Process Engineering,* v. 33, Sept. 1952, p. 483-485.

Development, design, construction, applications, and performance of equipment now being used in fields related to coal preparation, heavy chemicals, and metals. Illustrations. 11 ref. (B14)

334-B. The Iron Ore Position. A Survey of Current Developments. *Metallurgia,* v. 46, Aug. 1952, p. 79-82.

Importance of adequate iron ore supplies to production of United Kingdom's requirements of pig iron. Immediate and future prospects in the light of criteria by which ore reserves are assessed—quality, accessibility, and quantity. (B10, Fe)

335-B. The Production and Utilisation of Metallurgical Coke. J. P. Graham. *Metallurgia,* v. 46, Aug. 1952, p. 74-78, 82.

Coking industry in relation to present metallurgical coke position; production of coke and factors of importance in blast furnace coke utilization. Trends. 10 ref. (B18, D1, Fe)

336-B. (German.) **On the "Statistical Mechanics" of Grinding Processes.** O. Theimer. *Kolloid Zeitschrift,* v. 128, Aug. 1952, p. 1-6.

Theoretical study based on the observation that crushing effects in the grinding of powders are accompanied by sintering effects. The resulting formula is similar to Rosin-Rammler's well-known empirical formula. 12 ref. (B13, H10)

337-B. Where 1972's Iron Ore Is Coming From. *Business Week,* Oct. 4, 1952, p. 70-72, 74, 76-77.

Economic survey in which open pit vs. underground mining and beneficiation are discussed. (B10, B12, Fe)

338-B. Improving the Density and Strength of Charcoal Briquets. Theodore Breitmayer and Frank B. West. *Industrial and Engineering Chemistry,* v. 44, Sept. 1952, p. 2234-2237.

Pros and cons of the use of charcoal vs. coal and a study of two methods for above purpose. (B18)

339-B. Fundamental Investigation of Steel Plant Refractories Problems: VI. Arnulf Muan and E. F. Osborn. *Industrial Heating,* v. 19, Sept. 1952, p. 1696, 1698, 1700, 1702, 1704.

X-ray data for crystalline phases studied and a summary of characteristics of the four systems. Tables and graphs. (Concluded) (B19, D general)

340-B. On the Role of Alkali Cyanides in the Depression of Pyrite. K. K. Majumdar. *Journal of Scientific & Industrial Research,* v. 11B, Aug. 1952, p. 344-346.

Mechanism and experimental results. 11 ref. (B14)

341-B. Notes on the Metallurgy & the Resources of Rare Metals in South Africa. D. D. Stitt. *South African Mining and Engineering Journal,* v. 63, Aug. 30, 1952, p. 1103, 1105, 1107.

Presidential address to the Chemical, Metallurgical, and Mining Society of South Africa. Among the metals discussed are: Be, Li, Mg, Al, Zr, Ti, Mo, and U. (B10)

342-B. Metals and World Affairs. July 1950 to 1952. E. F. Jeal. *South African Mining and Engineering Journal,* v. 63, Aug. 30, 1952, p. 1119, 1121, 1123.

A general survey of economic conditions, including references to Southern Africa and its resources. (B10, A4)

343-B. Dwindling Coking Coal Reserves. A. Wyn Williams. *Utilization,* v. 6, Sept. 1952, p. 22-26.

Especially in relation to expansion of the steel industry. (B18, D general, ST)

344-B. Radioactivity in Mineral Dressing. A. M. Gaudin. *Mining Journal,* v. 249, Sept. 26, 1952, p. 340-342. (A condensation.)

Use as a research tool; for control of nonradioactive plant processes; and as a mineral separating tool. (B general, S19)

345-B. Factors in the Economics of Heat-Treated Taconites. Will Mitchell, Jr., C. L. Sollenberger, and Ford F. Miskell. *Mining Engineering,* v. 4, Oct. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 193, 1952, p. 962-967.

Heat treatment of ore prior to comminution reduces power requirements for grinding, reduces grinding media wear, and improves recovery of iron values from Minnesota magnetic taconite. Test data and analysis of economics of commercial application. Tables, graphs, and micrographs. (B13, Fe)

346-B. The Tromp Heavy Media Process. John Griffen. *Mining Engineering,* v. 4, Oct. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 193, 1952, p. 967-968.

The process and its applications to separation of coal and magnetite. (B14)

347-B. Improved Sintering at Benson. *Mining World,* v. 14, Oct. 1952, p. 32-33.

Method for feeding magnetite concentrates into sintering machines which results in increased capacity and better products. (B16)

348-B. Crushing Practice and Theory. Part X. Characteristics and Performance of Hammermills. Part XI. Crusher Product Curves and Tables. Brownell McGrew. *Rock Products,* v. 55, Sept. 1952, p. 67-69; Oct. 1952, p. 107-109, 156.

(To be continued.) (B13)

349-B. Hawkins Iron Ore Beneficiation Plant of the Cleveland-Cliffs Iron Company. W. R. Van Slyke. *Skillings Mining Review,* v. 41, Oct. 18, 1952, p. 1, 4, 12-13.

Plant which has been moved to edge of pit, in line with a present trend. Diagrammatic flow sheet is included. (B13, B14, Fe)

350-B. Treatment of Titaniferous Magnetite Ore From Iron Mountain, Wyo. A. E. Back, C. J. Chindgren, and R. G. Peterson. *U. S. Bureau of Mines,* Report of Investigations 4902, Aug. 1952, 15 pages.

Laboratory development of method. The ore is roasted with 15% Na_2CO_3 to convert vanadium to a water soluble form and fix soda for subsequent electric smelting step. Approximately 90% of V is recoverable in a product assaying 80% V_2O_5. Leached calcine is briquetted and smelted in a graphite-lined electric-arc furnace. Substantially all of Ti is recovered in a soda slag, assaying 60% TiO_2 and 2% Fe, which can be upgraded to 75-80% TiO_2 by leaching with dilute H_2SO_4. About 90% of Fe is recovered as pig iron, containing only minor amounts of V, Ti, and S. 11 ref. (B14, B17, D1, Fe, Ti)

351-B. (Book.) Fuels and Combustion. Marion L. Smith and Karl W. Stinson. 340 pages. McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y. $6.50.

Fundamental and factual information concerning solid, liquid, and gaseous fuels and the problems associated with their combustion. Theories of combustion of the three major classes of fuels, and latest designs of gas and oil burners and coal burning equipment. Combustion of fuels in engines, turbines and rockets. (B18)

352-B. (Book.) The Mineral Resources of the World. William Van Royen, Oliver Bowles, and Elmer W. Pehrson, editors. 181 pages. 1952. Prentice-Hall, Inc., 70 Fifth Ave., New York 11, N. Y.

Minerals reviewed are coal, petroleum, water, Fe, Mn, Ni, chromite, W, Mo, V, bauxite, Cu, Pb, Zn, Sn, Hg, Au, Ag, Pt-group metals, U, Ra, Th, phosphate rock, potash, sand pyrites, NaCl, diamond, asbestos, fluorspar, graphite, and mica. Numerous maps and graphs. (B10)

353-B. New Grinding Theory Aids Equipment Selection. Fred C. Bond. *Chemical Engineering,* v. 59, Oct. 1952, p. 169-171.

New theory which states that work necessary to break a ton of rock is inversely proportional to square root of the diameter of the product particles. Assumption is made that work input necessary to break rock is essentially that necessary to deform rock beyond its critical strain to form cracks. Equations and laboratory data. (B13)

354-B. Combustion and Fine Grinding With the Jet Mill. G. M. Croft and L. D. Bechtel. *Iron and Steel Engineer,* v. 29, Oct. 1952, p. 61-68.

Jet pulverizer can be applied in general to solid fuels for combustion purposes and to fine grinding of various other materials used in fields such as chemical, building materials, paper, food, and others. Pulverization is accomplished by collision of particles against themselves instead of against any portion of mill. Schematic diagram and photographs. (B13)

355-B. Disposal of Flotation Tailings. R. W. Unger. *South African Mining and Engineering Journal,* v. 63, Sept. 6, 1952, p. 15, 17.

Methods used by Idarado Mining Co., Colorado, to prevent pollution of streams, to reclaim and reuse mill water, and possibly retreat tailings. (B14, A8)

356-B. The Technology of Iron Ore. B. D. Thomas. "Resources for Freedom. Vol. IV. The Promise of Technology" (U. S. Govt. Printing Office, Washington), 1952, p. 40-44.

The role of technology and other factors in utilization of ores from various sources, in relation to various steel-producing districts. These districts are shown, together with their ore sources and potential quantities of ore. 14 ref. (B10, Fe)

357-B. The Technology of Manganese. S. L. Case and John W. Clegg. "Resources for Freedom. Vol. IV. The Promise of Technology" (U. S. Govt. Printing Office, Washington), 1952, p. 45-54.

Possible means for reduction of the large waste now encountered in smelting of ferromanganese. 18 ref. (B22, Fe-n)

358-B. Potential Sources of Alumina in Canada. W. K. Gummer. *Canadian Mining and Metallurgical Bulletin,* v. 45, Oct. 1952, p. 605-610; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 55, 1952, p. 365-370.

Data obtained by field men and various laboratories on rocks collected from Cape Breton to British Columbia. Includes information from government reports, particularly those on clays and shales and written from point of view of clay-consuming industries. (B10, Al)

359-B. On the Removal of Copper From Pyrites Cinder and the Roasting of Pyrites. Kiyokado Nishihara and Yoshio Kondo. *Memoirs of the Faculty of Engineering, Kyoto University,* v. 14, July 1952, p. 145-167.

Relationship between operating condition of a roaster and degree of leaching of copper from pyrites cinder was investigated, and on basis of results obtained, operating conditions of a mechanical roaster to increase degree of leaching copper from pyrites cinder were studied. Tables and graphs. (B15, Cu, Fe)

360-B. (German.) **The Magnetic Beneficiation of Low-Grade Iron Ore.** Heinz Hendrickx and Günter Scheibe. *Archiv für das Eisenhüttenwesen,* v. 23, Sept.-Oct. 1952, p. 321-324.

Experiments on reduction of iron ore to magnetic ferrous-ferric oxide with pulverized coal, activated carbon, starch, and paraffin. Results reveal that reduction is accomplished by organic carbon compounds rather than by pure carbon. X-ray pictures, tables, and diagrams. 16 ref. (B14, Fe)

361-B. (German.) **Evaluations of Grinding Experiments With the Aid of Grinding Functions.** O. Theimer and F. Moser. *Kolloid Zeitschrift,* v. 128, Sept. 1952, p. 68-74.

Relationship of the pulverizing mechanism to the grain-size distribution and the residues of grains larger than a given size. It is shown that the arithmetical average of grain sizes indicates (with certain limitations) the efficiency of the mill for a given grain size range. Diagrams and graphs. 4 ref. (B13)

362-B. Reserve Mining Co. Starts Taconite Plant At Babbitt. *Engineering and Mining Journal,* v. 153, Nov. 1952, p. 72-79.

Layout of plant with pictorial presentation of the plant, open-pit mines, and homes for workmen. (B14, B12, A6, Fe)

363-B. Geomines. A Major Open-Pit Tin Producer in the Belgian Congo. H. Barzin. *Engineering and Mining Journal,* v. 153, Nov. 1952, p. 86-89.

Distribution of minerals, mining altered and unaltered ores, and drilling problems. Concentration flowsheet includes crushing and grinding, screening, jigging, thickening, classification, and tabling operations. (B10, B12, B13, B14, Sn)

364-B. Continuous Updraft Sintering Recovers More SO_2 for Smelter. W. R. Burrow. *Engineering and Mining Journal,* v. 153, Nov. 1952, p. 90-94.

The process and comparison with downdraft processes. Pilot-plant experiments on a 75% Pb concentrate at the Broken Hill smelter, Port Pirie, South Australia. Photographs, diagrams, and tables. (B16, Pb)

365-B. How Induced Radioactivity May Help Separate Minerals. A. M. Gaudin, F. E. Senftle, and W. L. Freyberger. *Engineering and Mining Journal,* v. 153, Nov. 1952, p. 95-99, 174, 176.

Tests conducted at the Brookhaven National Laboratory to determine how induced radioactivity varies among the more common minerals and how these differences might be applied in their separation. Data are tabulated and charted. (B14, S19)

366-B. Raw Material Outlook Good for Western Steelmaking. S. G. Sargis. *Journal of Metals,* v. 4, Aug. 1952, p. 821.

Situation with respect to coking coals, limestones, and iron ores. (B18, B22, Fe)

367-B. Hot Rolling Behavior of Resulphurized Steels Improved With Manganese Sulphide Additions. S. Feigenbaum. *Journal of Metals,* v. 4, Aug. 1952, p. 825.

Experiences of Jones & Laughlin Steel Corp., mainly with C-1117 grade, but to some extent with C-1115, C1119, and C-1120. Addition of MnS reduced surface defects in hot rolled semifinished bars. (B22, F23, CN)

368-B. Strategic Minerals Conference. *Mines Magazine,* v. 42, Oct. 1952, p. 74-78.

Includes opening remarks by S. H. Williston, plus following brief articles: "Tungsten", Charles H. Segerstrom, Jr.; "Antimony", James P. Bradley; "Chromite", F. W. Libbey; "Mercury", Gordon I. Gould; and "The Development of Domestic Sources of Manganese", P. R. Bradley, Jr. (B10, A4)

369-B. Treatment of Complex Lead-Zinc Ores in the West. *Mines Magazine,* v. 42, Oct. 1952, p. 85-87.

Economic and technological problems. (B14, A4, Pb, Zn)

370-B. Microstructures in Iron Ore Pellets. Strathmore R. B. Cooke and Thomas E. Ban. *Mining Engineering,* v. 4, Nov. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 193, 1952, p. 1053-1058.

Mineralogy, structure, and strength of magnetite pellets fired in air and in a neutral atmosphere at various temperatures. Information is used to explain origin of structures occurring in pellets produced by pilot-plant operation. Graphs, micrographs, and tables. (B16, M27, Fe)

371-B. Concentration of Bastnaesite and Other Cerium Ores. J. B. Zadra, A. L. Engel, E. S. Shedd. **With Analytical Methods.** A. C. Rice. *U. S. Bureau of Mines,* Report of Investigations 4919, Oct. 1952, 15 pages.

Tests made on above ores. Tabulated data. (B14, S11, Ce)

372-B. (German.) **The Mineral Resources of Turkey and Their Utilization of the Home and Foreign Iron and Steel Industry.** Horst Weigelt. *Stahl und Eisen,* v. 72, Oct. 23, 1952, p. 1353-1364.

Development of Turkish mining industry including Government Mining Research Institute and its functions, and the significance of the most important mineral deposits. Iron and steel production at Karabük works. (B10, A9, Fe, ST)

373-B. (Book.) **Mining Year Book, 1952.** 572 pages. Walter E. Skinner, Financial Times, 20 Copthall Ave., London, England. 31s. 6d.

World-wide record of companies interested in the mining industry—officers, property description, and economics. List of mining and consulting engineers, mine managers, and agents. Buyers guide. (B12)

SECTION C

NONFERROUS EXTRACTION and REFINING

1-C. Cyanidation of Gold-Silver Ore From Manhattan, Nev. A. L. Engel. *U. S. Bureau of Mines,* Report of Investigations 4819, Oct. 1951, 6 pages.

Tests were made to investigate a proposed treatment method for gold and silver ore from the Keystone mine, Manhattan, Nye County, Nev. The ore was crushed to 10 mesh and separated into + and −65 mesh portions. The −65 portion is cyanided by leaching. Laboratory tests indicated that 89% of the Au and 49% of the Ag could be extracted. (C24, Au, Ag)

2-C. Semi-Pilot-Plant Investigations on Electrowinning Manganese From Chloride Electrolytes. J. H. Jacobs, P. E. Churchward, T. E. Hill, Jr., W. H. Curry, E. C. Perkins, and O. Q. Leone. *Mining Journal,* v. 237, Nov. 23, 1951, p. 523-524; Nov. 30, 1951, p. 552-554 (Excerpts from *U. S. Bureau of Mines,* Report of Investigation 4817.)

Previously abstracted from original. See item 122-C, 1951. (C23, Mn)

3-C. Wanted: Cheaper Titanium. *Chemical Week,* v. 69, Dec. 8, 1951, p. 27-28, 31.

The need for a cheap process of producing Ti. Various methods now in the development stage.
(C general, Ti)

4-C. Effect of Pressure on the Refining of Lithium by Distillation. R. R. Rogers and G. E. Viens. *Journal of the Electrochemical Society,* v. 98, Dec. 1951, p. 483-487.

The effect of distilling crude Li in the presence of the chemically inert gas argon and the chemically active gases, O_2, N_2, and H_2, at different pressures was investigated.
(C22, Li)

5-C. Preparation and Some Properties of Hafnium Metal. Felix B. Litton. *Journal of the Electrochemical Society,* v. 98, Dec. 1951, p. 488-494.

The Hf was separated from Zr by a fractional distillational procedure. Miscellaneous properties are tabulated. 18 ref.
(C22, Q general, Hf)

6-C. Dollar-a-Pound Titanium? *Chemical Engineering,* v. 58, Nov. 1951, p. 278.

Production costs can go to this and even lower, say Japanese owners, if they can operate their new process on a large enough scale. Four basic operations make up the process: reduction of iron sand in an electric furnace, producing charcoal pig iron and Ti bearing slag; chlorination of the slag, producing $TiCl_4$; purification of $TiCl_4$; and reduction of $TiCl_4$ with Mg and vacuum distillation to produce metallic Ti. Includes flow diagram.
(C4, C26, C27, Ti)

7-C. The Physical Nature of Solid Condensates Produced in the Distillation of Volatile Metals. I. I. Betcherman and L. M. Pidgeon. *Canadian Mining and Metallurgical Bulletin,* v. 44, Nov. 1951, p. 730-735; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 54, 1951, p. 460-465.

Investigation was confined to the sublimation and distillation of Mg and Ca but results are applicable to cases where the metal is liberated in the gaseous state by reduction of a suitable ore. 12 ref. (C22)

8-C. Electrothermic Treatment of Nickeliferous Ores of Lokrys (Greece). (In French.) Corrado Ferrente. *Journal du Four Electrique et des Industries Electrochimiques,* v. 60, Sept.-Oct. 1951, p. 115-117.

Production of cast nickel and ferronickel. Composition and characteristics during processing.
(C21, Ni, Fe-n)

9-C. Aluminothermic Production of Aluminum-Titanium Alloys. (In French.) Jean Cueilleron and Claude Pasgaud. *Comptes Rendus hedbomadaires des Séances de l'Académie des Sciences,* v. 233, Oct. 1, 1951, p. 745-747.

A series of Al-Ti alloys were prepared by aluminothermic reduction of TiO_2 in the presence of a flux and of a substance capable of furnishing oxygen, or in gaseous oxygen, the latter being brought to the surface of the mixture during the reaction. (C26, Al, Ti)

10-C. The Removal of Aluminium From Red Brass. Part II. (In Swedish.) Ake V. Larsson and Börje Löfgren. *Gjuteriet,* v. 41, Oct. 1951, p. 143-151.

Al can be removed from red-brass melts by refining with fluoride-bearing fluxes. The soundness and mechanical properties of a red-brass alloy treated with such fluxes were investigated. Silicon can be removed by the same methods used for Al refining if the melt is free from Al. Influence of small amounts of Al and Si on soundness and mechanical properties. Tendency of the melt to pick up sulfur, when refining with fluxes containing Na_2So_4 as an oxidizer. (C4, Cu)

11-C. Electrolytic Refining of Copper From Ammoniacal Cuprous Salt Solutions. Fred A. Schimmel. *Industrial and Engineering Chemistry,* v. 43, Dec. 1951, p. 2943-2948.

Explores the possibility of refining copper using an ammoniacal electrolyte. With a given amount of electricity, twice as much Cu can be refined as with the customary H_2SO_4 process. This process seems particularly adapted to the winning of Cu from Cu-containing solutions. (C23, Cu)

12-C. The Aluminium Industry. T. G. Pearson. *Chemistry & Industry,* Nov. 17, 1951, p. 988-997.

Development of the industry. Methods of production of Al from its ores. 34 ref. (C general. B14, Al)

13-C. Refining Secondary Copper Alloys. Marvin Glassenberg, L. F. Mondolfo, and A. H. Hesse. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 465-471; disc., p. 471.

Previously abstracted from Preprint 65. See item 60-C, 1951. (C21, A8, Cu)

14-C. Refining of Aluminum-Silicon Alloys. (In French.) Louis Grand. *Fonderie,* Oct. 1951, p. 2625-2635.

Use of Na in low-temperature refining. Refining influences of Na and other elements. 15 ref. (C4, Al, Si)

15-C. Kinetics of the Reduction of Copper-Tin Alloys in a Stream of Hydrogen Chloride. (In German.) Peter Treadwell and W. D. Treadwell. *Helvetica Chimica Acta,* v. 34, Oct. 15, 1951, p. 1723-1731.

Determination of reaction equilibria of Cu and Sn with HCl according to the flow and circulation methods. Characteristic maxima of reaction rates were observed in the range of the intermetallic compounds Cu_6Sn_5, Cu_3Sn, and Cu_3Sn_8. 18 ref. (C4, Cu, Sn)

16-C. Electrolysis in Phosphate Melts. IV. Electrolysis of Oxides of Vanadium, Columbium, and Tantalum in Phosphate Melts. (In German.) Hellmuth Hartmann and Werner Müssing. *Zeitschrift für anorganische und allgemeine Chemie,* v. 266, Oct. 1951, p. 98-104.

Results of experiments, conducted to determine the feasibility of obtaining the pure metals in this way. 12 ref. (C23, V, Cb, Ta)

17-C. Facilitating the Reduction of Metal Compounds by Alloy Formation and Accompanying Calculations. (In German.) N. G. Schmahl. *Zeitschrift für anorganische und allgemeine Chemie,* v. 266, Oct. 1951, p. 1-29.

Examples show that various metal compounds are more readily reduced by alloying them with other metals, thus reducing the pressure of decomposition or altering their equilibrium constants. 36 ref. (C general)

18-C. Contributions to the Chemistry of Columbium and Tantalum. (In German.) **V. Preparation of Titanium and Tin-Free Columbium and Tantalum.** Harald Schäfer, Lisel Bayer, and Christel Pietruck. **VI. Separating Columbium and Tantalum by Reducing the Columbium Pentachloride.** Harald Schäfer and Christel Pietruck. *Zeitschrift für anorganische und allgemeine Chemie,* v. 266, Oct. 1951, p. 140-160.

Review of literature and description of experiments. 52 ref. (C general, Cb, Ta)

19-C. Production of Titanium Metal. *Light Metal Age,* v. 9, Dec. 1951, p. 20.

Photographs showing highlights of the process for reduction by Mg in a pilot plant of the U. S. Bureau of Mines at Boulder City, Nev. (C26, Ti)

20-C. Forum on Technical Progress: Metals Production. *Steel,* v. 130, Jan. 7, 1952, p. 221-224, 227, 230, 232, 234, 237.

Brief discussions by men from industry on the present situation and anticipations for 1952. (C general, D general)

21-C. Reduction of Zinc Ores in Vertical Retorts. Karol Kotlarczyk. (In Polish.) *Hutnik,* v. 17, Nov.-Dec. 1950, p. 427-434.

Details of the New Jersey Zinc Co. process. Diagrams. 15 ref. (C21, Zn)

22-C. Independent Extruder Casts His Own Billet. *Modern Metals,* v. 7, Dec. 1951, p. 38, 40.

A melting, holding, and casting installation for the production of Al extrusion billets. (C5, E10, Al)

23-C. Electrolytic Preparation of Titanium. G. D. P. Cordner and H. W. Worner. *Australian Journal of Applied Science,* v. 2, Sept. 1951, p. 358-367.

Some exploratory experiments in which Ti powder was electrodeposited from a molten mixture of $TiCl_3$ with LiCl and KCl. The cathode deposit was a fine, dendritic form, comparable with that of metal produced by the reduction of $TiCl_4$ with Mg. 10 ref. (C23, H10, Ti)

24-C. Systematizing the Copper Production Process and Electrothermal Lead Production at the Smelting Plant in Ronnskar, Sweden. (In German.) Olov Herneryd. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 4, Nov. 1951, p. 412-418.

Means applied to increase efficiency of Cu and Pb production. A photograph, diagrams, and tabular data. (C23, Cu, Pb)

25-C. The Production of Pure Cerium Metal by Electrolytic and Thermal Reduction Processes. P. M. J. Gray. *Bulletin of the Institution of Mining and Metallurgy,* Jan. 1952; *Transactions,* v. 61, pt. 4, 1951-52, p. 141-170.

Production of pure Ce by electrolytic reduction of its fused trichloride and its dioxide dissolved in a bath of fused fluorides and thermal reduction of the trichloride and trifluoride. Graphs and tables. 36 ref. (C23, C21, Ce)

26-C. High Vacuum Melting. *Canadian Metals,* v. 15, Jan. 1952, p. 31.

A furnace that produces high-grade alloy melts in a gas-free chamber. Diagram. (C5, D9)

27-C. Revere Installs Large Water-Cooled Mold. *Iron Age,* v. 169, Jan. 24, 1952, p. 68.

Special feature is the honeycomb-shaped compartments for cooling water. Designed for casting brass ingots up to 10,000 lbs. in weight. (C5, Cu)

28-C. Mechanism of the Reduction of Oxides and Sulphides to Metals. Carl Wagner. *Journal of Metals,* v. 4, Feb. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 214-216.

Migration of metal over distances of several mm. was observed in the following reactions: reduction of silver sulfide by Cu; reduction of cuprous sulfide by Fe; and reduction of cuprous sulfide by cuprous oxide. (C21, P12, Ag, Cu)

29-C. Ductile Titanium. *Metal Industry,* v. 80, Jan. 11, 1952, p. 29-30.

Production methods. Flow sheet of the process used for converting $TiCl_4$ into powdered metallic Ti. (C4, Ti)

30-C. Pure Cerium Metal. P. M. J. Gray. *Metal Industry,* v. 80, Jan. 18, 1952, p. 43-46. (Condensed from *Bulletin of the Institution of Mining and Metallurgy.)*

See abstract of original from above. *Transactions,* item 25-C, 1952. (C23, C21, Ce)

31-C. Researches on Nickel Matte. C. C. Downie. *Mining Journal,* v. 238, Jan. 4, 1952, p. 12-13.

Modification of smelting, converting, and matte refining procedure developed for application to ores containing a considerable amount of copper. An adaptation of the oxalic acid process and an electrorefining process are discussed. (C21, C23, Ni)

32-C. Olivine As a Source of Magnesium. Norman Ketzlach and R. W. Moulton. *Trend in Engineering at the University of Washington,* v. 4, Jan. 1952, p. 21-24. (Condensed from thesis.)

Olivine may be leached with HCl and NH_4Cl or $CaCl_2$ and acid to give a solution containing a much higher percent Mg than found in olivine ore. Using CaC_2 as reducing agent, yield was found to increase with increase in time, temperature, and fineness of the charge. 10 ref. (C26, B14, Mg)

33-C. Contribution to Knowledge Concerning Aluminum Electrometallurgy. (In French.) *Journal du Four Electrique et des Industries Electrochimiques,* v. 60, Nov.-Dec. 1951, p. 143-144.

A brief study of the equilibria of cryolite-alumina melts. Includes graphs. (C23, Al)

34-C. Technology of Magnesium Production. (In German.) W. Moschel. *Angewandte Chemie,* v. 63, Sept. 21, 1951, p. 385-395.

Reviews present status of electrolytic and thermal production of Mg in Germany and the U. S. The most successful electrolytic methods economically are shown to differ in choice of raw material, preparation of charge, and design of electrolytic cell. Includes illustrations, graphs, and tabulated data. 78 ref. (C21, C23, Mg)

35-C. Gold Refining With Ripple Current From Rectifiers. (In German.) Julius Steiner. *Zeitschrift für Elektrochemie und angewandte physikal-*

ische Chemie, v. 55, Dec. 1951, p. 690-695.

Rectified single-phase a.c. in a half-wave circuit has the same effect as a ripple current produced by superposition of a.c. and d.c. An attempt is made to express, by simple formulas, the electrolytic effects of the ripple-current curve. Tables, graphs, diagrams, and photomicrographs. (C23, Au)

36-C. Ingot Manufacture. W. G. Mochrie. *Metal Industry,* v. 80, Jan. 25, 1952, p. 63-66.

Economic factors, competition with other industries, varying refining methods, plant, and practice for nonferrous ingots. Particular attention is devoted to scrap-metal segregation. (C general, A8, EG-a)

37-C. Chemistry of Columbium and Tantalum. VIII. The Cb_2O_5-Ta_2O_5-CbO_2-TaO_2-H_2O-H_2 System. (In German.) Harald Schäfer and Gunther Breil. *Zeitschrift für anorganische und allgemeine Chemie,* v. 267, Jan. 1952, p. 265-276.

Arrangement and experimental procedure for determining reducibility of Cb_2O_5 and Ta_2O_5 (and mixtures of the two oxides) in a stream of H_2 plus water vapor at 900° C. Data are charted. 28 ref. (C2, Cb, Ta)

38-C. Kaiser Chalmette in Production. *Light Metal Age,* Feb. 1952, p. 12-14, 30.

Production of Al by electrolytic reduction of Al_2O_3 at the above plant. (C23, Al)

39-C. Copper and Copper Alloys. 6. Concerning the Metallurgy of Copper. W. G. R. DeJager. *Metalen,* v. 6, Dec. 15, 1951, p. 452-454.

Processes of copper refining, particularly fire refining and electrolytic refining. Photomicrographs show structure of Cu_2O inclusions in Cu. (C21, C23, Cu)

40-C. Refining Nickel Matte. C. C. Downie. *Mining Journal,* v. 238, Feb. 1, 1952, p. 114-115.

The production and handling of nickel matte in blast furnace and converter in so far as garnierite and nickel silicate ores generally are concerned. (C21, Ni)

41-C. MacArthur-Forrest Cyanide Process. J. S. MacArthur. *South African Mining and Engineering Journal,* v. 62, Jan. 12, 1952, p. 873.

Process used in recovery of gold. (C24, Au)

42-C. Titanium: How It Is Made. *Modern Metals,* v. 8, Feb. 1952, p. 29-31.

The method by which hot $TiCl_4$ vapor is reduced to metallic Ti by hot, semi-molten Mg. (C26, T5, Ti, Mg)

43-C. Experiences of a Czechoslovakian Engineer in the USSR. (In Czech.) Arnost König. *Hutnické Listy,* v. 6, Nov. 1951, p. 544-546.

Experiences of the author, who made a three-month visit to the USSR, where he studied the production of copper in Soviet metallurgical plants. (C general, Cu)

44-C. Reduction of the Copper Content in Slags From Reverberatory Furnaces. (In Czech.) *Hutnické Listy,* v. 6, Nov. 1951, p. 552-554.

Analyzes the method developed in a certain Czech plant. This method is said to lower significantly the loss of Cu during smelting. (C21, Cu)

45-C. Silicothermic Production of Magnesium. (In French.) W. J. Kroll. *Revue de Métallurgie,* Dec. 1951, p. 929-943; disc., p. 943.

Details of process developed in the U. S., industrial uses, and economic aspects. Tables and diagrams. 78 ref. (C26, Mg)

46-C. High-Purity Metals at Last. *Business Week,* Mar. 22, 1952, p. 133-134, 136.

A purifying technique by National Research Corp., Cambridge, Mass. A metal is melted in a high vacuum; this takes out the trapped gases and prevents the formation of oxides. At present, the process is important to the production of Ti and Zr. Later, it is believed that it will probbly play a big part in the production of magnetrons. (C25, Ti, Zr)

47-C. Production of Pure Rare Earth Metals. Frank H. Spedding, Harley A. Wilhelm, Wayne H. Keller, Donald H. Ahmann, Adrian H. Daane, Clifford C. Hach, and Robert P. Ericson. *Industrial and Engineering Chemistry,* v. 44, Mar. 1952, p. 553-556.

A method was devised in which anhydrous rare-earth chlorides are reduced by Ca in refractory oxide-lined containers. Vacuum remelting removes all but trace amounts of Ca. La, Ce, Pr, Cb have been produced purer than 99.7%. 25 ref. (C25, EG-d, La, Ce, Pr, Cb)

48-C. The Separation of Titanium, Zirconium and Thorium by Ion Exchange. William E. Brown and William Rieman, III. *Journal of the American Chemical Society,* v. 74, Mar. 5, 1952, p. 1278-1282.

Method developed. Radiochemical work with Ti^{51} showed that the radioactive isotope was, to a certain extent, separated from the normal isotopes. (C28, P13, Ti, Zr, Th)

49-C. Treasure From the Slag Pile. A. W. Martinez. *Steelways,* v. 8, Mar. 1952, p. 1-3.

New method of recovering Mn

from hitherto worthless slag, devised by the steel industry in cooperation with the U. S. Bureau of Mines. The new process results in synthetic Mn ore containing 55-63% Mn. (C21, A8, Mn)

50-C. Cryoscopy at High Temperature. (In French.) Georges Petit. *Revue Générale des Sciences pures et appliquées,* v. 58, Nos. 11-12, 1951, p. 324-340.

High-temperature cryscopy applies classical techniques and theories to the problems of molten-salt solutions. Relationship to aqueous salt solutions, and application to electrochemistry and electrometallurgy. (To be continued.) (C23)

51-C. Autogenous Smelting of Sulfidic Copper Ores; Production of Iron From Iron Silicate Slags of Copper Smelting Furnaces. (In German.) Petri Bryk. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 4, Dec. 1951, p. 447-450.

Special type of copper smelting, developed because Finland has no cheap electric power at its disposal since the second World War, and no domestic fuel either. Details of process; also a new closely related process for the production of iron and steel. (C21, D general, Cu, Fe, ST)

52-C. Behavior of the Nobler Metals During Refining of Aluminum According to the Triple-Layer Process. (In German.) G. Grube and P. Hantelmann. *Zeitschrift für Elektrochemie Bericht der Bunsengesellschaft für Physikalische Chemie,* v. 56, Jan. 1952, p. 1-8.

Experiments on measuring the potentials of anodic solution of Mn, Si, Zn, Fe, Cu, and Ag in the electrolyte used for refining of Al, as a means of developing a method for refining Al scrap and Al-rich alloys. The high vapor pressure of Zn at the test temperature (850° C.) is shown to be the reason why small concentrations of Zn pass into the cathode aluminum. Tables and graphs. (C23, Al)

53-C. Electrolysis of Molten Cuprous Chloride. (In German.) Paul Drossbach. *Zeitschrift für Elektrochemie Berichte der Bunsengesellschaft für Physikalische Chemie,* v. 56, Jan. 1952, p. 23-31.

Theoretical studies and experiments on current yields and polarization potentials under different conditions. Diagrams, graphs, tables, and photographs. (C23, Cu)

54-C. Electrolysis of Nickel Chloride. (In German.) Paul Drossbach. *Zeitschrift für Elektrochemie Berichte der Bunsengesellschaft für Physikalische Chemie,* v. 56, Jan. 1952, p. 31-35.

Method of determining current yields and polarization potentials in electrolysis of $NiCl_2$ mixed with molten NaCl + KCl. Concentration polarization resulting from diffusion is theoretically analyzed. (C23, Ni)

55-C. Influence of Tribenzylamine on the Process of Electrocrystallization of Tin. (In Russian.) A. A. Kriukova and M. A. Loshkarev. *Doklady Akademii Nauk SSSR,* new ser., v. 81, Dec. 21, 1951, p. 1097-1100.

Results of experimental investigation are charted and tabulated. Effects of different additives to the deposition solutions were determined. (C23, Sn)

56-C. The Production of Pure Cerium Metal by Electrolytic and Thermal Reduction Processes. *Bulletin of the Institution of Mining and Metallurgy,* Mar. 1952; *Transactions,* v. 61, pt. 6, 1951-52, p. 289-298.

Discussion of above paper by P. M. J. Gray (Jan. 1952 issue; item 25-C.) (C23, C21, Ce)

57-C. Production of Titanium Ingots by Melting Sponge Metal in Small Inert-Atmosphere Arc Furnaces. W. E. Kuhn. *Journal of the Electrochemical Society,* v. 99, Mar. 1952, p. 89-96.

Two laboratory arc furnaces are described. Satisfactory melting of Ti sponge in the inert-atmosphere arc furnace using nonconsumable electrodes is limited to sponge low in $MgCl_2$, because the presence of entrained chloride causes spattering of the molten Ti onto the electrode tip, and contamination of the melt by the electrode material. 16 ref. (C21, Ti)

58-C. Development of Graphite Electrodes and Study of Heat Losses With Different Electrodes in the Single Electrode Inert-Atmosphere Arc Furnace. W. E. Kuhn. *Journal of the Electrochemical Society,* v. 99, Mar. 1952, p. 97-108.

A Ti-TiC coated graphite-tipped electrode was developed for melting Ti without excessive C pickup. The principles evolved from the melting of Ti and Zr may be extended to the development of graphite tips coated with other carbide-forming elements. The effect of varying arc length, arc current, and arc voltage on the steady-state heat losses in the cooling water supplied to the electrode, crucible walls, and crucible bottom was studied. Tungsten-tipped electrodes exhibited more efficient arc melting characteristics than graphite tips. Tabular and graphical data. (C21, T5, Ti)

59-C. Removal of Magnesium and Magnesium Chloride From Titanium by Vacuum Distillation. M. A. Cook and F. S. Wartman. *U. S. Bureau of Mines,* Report of Investigations 4837, Feb. 1952, 17 pages.

A method of vacuum purification in which the crude mixture is heated in a vacuum at about 1700° F. and the Mg metal and chloride volatilized away from the Ti, leaving it practically Mg-free in a sponge-metal form. The pilot-plant equipment, together with the technique of operation and methods of sponge recovery. Operating data; and power and labor requirements. (C25, Mg, Ti)

60-C. Vacuum Metallurgy; Its Characteristics and Its Scope. W. J. Kroll. *Vacuum,* v. 1, July 1951, p. 163-184.

The actual and potential uses of vacuum methods in metallurgy. Existing furnace designs, their performance, and limitations. A large variety of metallurgical procedures, where the application of vacuum would appear to offer advantages. Melting and separation of metals are emphasized; however, considerable attention to vacuum processing of inorganic compounds is also given. 88 ref. (C25, D8)

61-C. Refining of Aluminum-Silicon Alloys. (In French.) Louis Grand. *Revue de l'Aluminium,* v. 29, Jan. 1952, p. 5-15.

Modification of the texture of Al-Si alloys caused by alkali metals or their fluorides leads to an important improvement of the mechanical characteristics of these alloys. Grain refining which occurs during a limited period of time can be obtained at any temperature ranging from about 720 to 820° C. In the particular case of high-Si alloys, phosphorus causes a lasting structural modification and the metal is more easily machined than if it had been refined with alkali metals. (C26, Al)

62-C. Reactions in the Muffle of a Zinc Furnace. (In Polish.) A. Krupkowski and J. Sosin. *Prace Glownego Instytutu Metalurgii,* v. 3, No. 6, 1951, p. 437-461.

During the reduction of Zn, a number of chemical reactions take place in the muffle of a furnace between carbon and the compounds of Zn, Pb, Fe, Cu, Cd, Sn, etc. The composition of gas evolved from the Zn dust is used as basis for calculation of direction and intensity of above reactions at 1200° K. Conclusions are summarized in English. Data are tabulated and charted. (C21, Zn)

63-C. Investigations of the Solidification of Duralumin in a Water-Cooled Sheet-Iron Ingot Mold. (In Polish.) M. Schneider and E. Zalesinski. *Prace Glownego Instytutu Metalurgii,* v. 3, No. 6, 1951, p. 491-500.

The process takes place in two stages, loss of heat by radiation and the solidification process in the interior of the ingot. Diagram for the process and recommendations for rate of cooling. (C5, N12, Al)

64-C. The Reduction of Copper Oxide by Hydrogen. (In Russian.) M. M. Pavlinchenko and Ia. S. Rubinchik. *Zhurnal Prikladnoi Khimii,* v. 24, June 1951, p. 666-670.

Experiments were made to study the dependence of the rate of reduction of copper oxide on temperature and the presence of other materials. Results are charted. 11 ref. (C2, Cu)

65-C. The Influence of Roasting Temperature Upon Gold Extraction by Cyanidation From Refractory Gold Ores. R. Carter and C. S. Samis. *Canadian Mining and Metallurgical Bulletin,* v. 45, Mar. 1952, p. 160-166; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 55, 1952, p. 130-136.

A laboratory method, using aqueous oxidation under high oxygen pressures, in which gold recovery from the calcines was over 98%. Photomicrographs, diagrams, and tables. (C24, Au)

66-C. Industrial High Vacuum and Its Application to Some Metallurgical Problems. J. P. Baxter. *Australasian Engineer,* Feb. 7, 1952, p. 76-79.

High-vacuum methods and the design problems they pose for the engineer. Examples of vacuum metallurgy. (C25)

67-C. Better Brass Mill Products by Continuous Casting. Edward L. Wolff and Frederick M. Barry. *Materials & Methods,* v. 35, Apr. 1952, p. 94-97.

Continuous-cast brass mill products show outstanding chemical uniformity and structural soundness. (C5, Cu)

68-C. Cobalt Metallurgy at the Union Miniere of Upper Katanga. (In French.) *Journal du Four Electrique et des Industries Electrochimiques,* v. 61, Jan.-Feb. 1952, p. 7-9.

Cobalt metallurgy in Katanga (Belgian Congo) with respect to the development of pyro-metallurgical and hydrometallurgical processes. (C general, Co)

69-C. Refined Aluminum; Fabrication and Applications. (In French.)

Journal du Four Electrique et des Industries Electrochimiques, v. 61, Jan.-Feb. 1952, p. 17-21.

Production of commercial Al, the principle of the process, improvements made with regard to the composition of the bath, refining of Al scrap, and properties and applications of refined Al. Emphasis is on electrolytic production methods. (C23, Al)

70-C. Laws of the Common Discharge of Ions and the Theory of Electrolytic Refining of Metals. (In Russian.) V. L. Kheifets and A. L. Rotinian. *Doklady Akademii Nauk SSSR,* new ser., v. 82, Jan. 21, 1952, p. 423-426.

A theoretical discussion. Comparisons are made with experimental curves for several solutions. 15 ref. (C23)

71-C. Silicothermic Magnesium Comes Back. Elliot Schrier. *Chemical Engineering,* v. 59, Apr. 1952, p. 148-149.

A report on the present status. The process is not competitive with electrolytic Mg, but is being used to meet demands for production. The process is being improved; continuous operation is under study. (C26, Mg)

72-C. Germanium's Electronic Upsurge. Joseph A. O'Connor. *Chemical Engineering,* v. 59, Apr. 1952, p. 158-160, 290.

Historical details, and production of Ge from Zn ore. Includes brief account of beneficiation process. (C general, B14, Ge)

73-C. Arc Melting of Zirconium Metal. H. L. Gilbert, W. A. Aschoff, and W. E. Brennan, II. *Journal of the Electrochemical Society,* v. 99, May 1952, p. 191-193.

In arc-melting Zr metal with a tungsten electrode, W appears in nonuniform amounts throughout the ingot. To elimiante this, use of consumable electrodes of Zr sponge is proposed. The arc is stabilized with a small amount of Mg metal added to the Zr sponge used in making up the electrodes. A water-cooled Cu sleeve is used as a melting section in the arc melting furnace. Melting is done under an inert atmosphere of A or He. Metallographic and radiographic studies show the finished ingots to be sound. 12 ref. (C21, Zr)

74-C. Production at Garfield: World's Largest Copper Smelter. R. Thompson. *Journal of Metals,* v. 4, May 1952, p. 456-459.

Equipment and processes. Current daily production is 775 tons of Cu in anode shapes. (C21, Cu)

75-C. The Cathodic Reduction of Copper Oxide. (In French.) Pierre Jolibois and André Sancelme. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Mar. 3, 1952, p. 1007-1010.

The electrolytic reduction of copper oxides was studied. Existence of two new crystalline varieties of Cu, one having the structure of CuO, and the other that of Cu_2O, was established by X-ray methods. (C23, Cu)

76-C. Processing Speculum Metal. (In German.) Joseph Blanderer. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 5, Mar. 1952, p. 90-95.

Material consists largely of Cu, Sn, and Sb, plus varying, but low, percentages of Pb. It is a typical byproduct of the smelting of Pb and Sn ores. New process, applied in Germany, by which it is oxidized in a two-step process, then separated into the component metals by a series of chemical operations. (C28, Cu, Sb, Sn, Pb)

77-C. Cyanamid Finds New Way to Get Metal From Ore. *Business Week,* May 17, 1952, p. 52, 54.

See abstract on "Chemical Ore Reduction Process May Pay Out in Three Years", *Chemical and Engineering News;* item 78-C, 1952. (C general, B14, Ni, Co, Cu, Mn)

78-C. Chemical Ore Reduction Process May Pay Out in Three Years. *Chemical and Engineering News,* v. 30, May 19, 1952, p. 2104-2105.

New high-temperature, high-pressure, all-chemical process for recovery of Ni, Co, Cu, or Mn from ore or scrap, just announced by Chemical Construction Co., a subsidiary of American Cyanamid. Ore concentrates are made by conventional flotation methods, then leached in H_2SO_4 under pressure to oxidize the sulfur to sulfate. The gangue is filtered out along with the insoluble arsenic compounds and a cation-exchange reaction or cementation step removes the copper salts. The solution is made ammoniacal and reduced with hydrogen under pressure. By altering temperatures and pressures of the reduction it is possible to bring down one metal at a time in order of their appearance in the electromotive series. It is believed impractical to recover any metal above Zn in the electromotive series. Three refineries already are being built to utilize the process. (C general, B14, Ni, Co, Cu, Mn)

79-C. Smelting By-Passed in Metals Revolution. *Chemical Week,* v. 70, May 17, 1952, p. 43-44, 46.

See abstract of "Chemical Ore Reduction Process May Pay Out in Three Years", *Chemical and Engineering News;* item 78-C, 1952.
(C general, B14, Ni, Co, Cu, Mn)

80-C. Method For Freeing Zirconium of Common Impurities and for Preparing Zirconium Sulfate and Oxide. W. Stanley Clabaugh and Raleigh Gilchrist. *Journal of the American Chemical Society,* v. 74, Apr. 20, 1952, p. 2104-2105.

A method of purification based on the sulfate. (C general, Zr)

81-C. The Kroll Process for Titanium Sponge. *Metal Progress,* v. 61, May 1952, p. 122, 124. (Condensed from "Ductile Titanium").

Previously abstracted from *Metal Industry.* See item 29-C, 1952.
(C4, Ti)

82-C. Smelting Aluminium Ores. Evans W. Buskett. *Mine and Quarry Engineering,* v. 18, May 1952, p. 157-160.

The Boyer and Hall process for production of pure Al. (C23, Al)

83-C. Magnesia and Magnesium From Sea-Water. P. Litherland Teed. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. "Mineral Resources", 1951, p. 257-261; disc., p. 265-268.

History of development in Great Britain. Two different processes used, their advantages and disadvantages. Application trends of the metal. (C22, Mg)

84-C. Technique of Melting and Casting Metals and Alloys in a High Vacuum. (In French.) W. Fischer and O. Winkler. *Revue de Métallurgie,* v. 49, Mar. 1952, p. 211-220.

Fields of application, equipment, and the process itself. Diagrams and photographs. (C25, D8)

85-C. Principles Used in the Pyrometallurgical Processes of Lead Refining. (In Portuguese.) Tharcisio D. de Souza Santos. *Boletim da Associacao Brasilera de Metais,* v. 7, Oct. 1951, p. 527-559; disc., p. 559.

Principles of various processes used for eliminating impurities existing in primary and secondary lead. Includes table and a large number of phase diagrams for binary Pb alloys, reproduced from "Metals Handbook" and other sources. 35 ref. (C21, M24, Pb)

86-C. Development of Processes for Extractive Metallurgy of Copper in View of the Possibilities of Their Application in Brazil. (In Portuguese.) Tharcisio D. de Souza Santos. *Boletim da Associacao Brasilera de Metais,* v. 7, Oct. 1951, p. 560-572.

13 references. (C21, Cu)

87-C. Some New Metallurgical Processes for Tin in View of the Possibilities of Their Application in Brazil. (In Portuguese.) Tharcisio D. de Souza Santos. *Boletim da Associacao Brasilera de Metais,* v. 7, Oct. 1951, p. 573-581.

(C general, Sn)

88-C. The Electrochemistry of Nickel. W. A. Wesley. *Industrial and Engineering Chemistry,* v. 44, May 1952, p. 957-965.

Present knowledge, both scientific and practical, of the electrochemical reactions of Ni as they find application in industry today. Evidence is cited to show that it is possible to electrodeposit sound Ni metal at speeds much higher than have yet been employed commercially. Industrial processes discussed include electrorefining, electroforming, electroplating, resizing of mismachined parts, and electropolishing. 20 ref. (C23, L13, L17, L18, Ni)

89-C. Some Aspects of Titanium Metallurgy. W. J. Kroll. *Metal Industry,* v. 80, May 2, 1952, p. 343-345; May 9, 1952, p. 383-386, 388.

Primarily devoted to chemistry as a basis for Ti production methods. Detailed discussion of a table of physical properties of Ti compounds. The more common reducing agents, their chlorides, and fluorides. Possibilities of Ti reduction by means of various metals indicating process involved, feasibility, kind of metal obtained, and disadvantages. 23 ref. (C26, C4, Ti)

90-C. Pure Metals From Ore Concentrates. *Steel,* v. 130, May 26, 1952, p. 76-77.

See abstract of "Chemical Ore Reduction Process May Pay Out in Three Years", *Chemical and Engineering News;* item 78-C, 1952.
(C general, B14, Ni, Co, Cu, Mn)

91-C. Role of the Aggregation State of Hard-to-Reduce Oxides During Their Reduction by Carbon in Industrial Furnaces. (In Russian.) A. S. Mikulinskii. *Zhurnal Prikladnoi Khimii,* v. 24, Dec. 1951, p. 1235-1245.

Various problems connected with the production of materials such as Si from SiO_2. The vapor stage of SiO was found to be very important. 16 ref. (C21)

92-C. Chemical Treatment of Molten Non-Ferrous Metals. Part 1. D. A. Dodson. *Canadian Metals,* v. 15, May 1952, p. 32, 34-35, 64.

Chemical treatment for removal of impurities, improvement of castability, adjustment or control of alloy compositions, and improvement of physical properties of the Cu alloys. (C21, C5, Cu)

93-C. Electric Furnace Smelting of Zinc Ores; the Sterling Process. E. C. Handwerk, G. T. Mahler, and L. D. Fetterolf. *Journal of Metals,* v. 4, June 1952, p. 581-586.

New process by which Zn metal, together with its accompanying values, and pig iron, are produced. All of these elements except for a controlled amount of iron are almost completely eliminated from the slag. It has been used on high-grade Zn concentrates from which substantial recovery of secondary values can be realized. The Pb, Cd, and some of the Ag, are collected in the Zn metal, while Cu, Au, and the remaining Ag are concentrated in the pig iron.
(C21, Zn, Pb, Cd, Cu, Au, Ag, Fe)

94-C. New Chemical Method Recovers Nickel, Cobalt, Copper Metal. *Journal of Metals,* v. 4, June 1952, p. 589-591.

See abstract of "Chemical Ore Reduction Process May Pay Out in Three Years", *Chemical and Engineering News;* item 78-C, 1952.
(C general, B14, Ni, Co, Cu, Mn)

95-C. Melting of Undoped Silicon Ingots. J. Hino and H. E. Stauss. *Journal of Metals,* v. 4, June, 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952. p. 656.

Preparation of Si in bulk form. The usual method involves use of selected added constituents as "doping" agents. Two basic problems in producing Si ingots free of doping additions: prevention of spitting and prevention of cracking of the ingot during freezing. (C5, Si)

96-C. Continuous Casting and Rolling Venetian Blind Slat Stock. *Modern Metals,* v. 8, May 1952, p. 45-48.

The machine at Hunter Douglas Corp.—particularly the casting unit—is well adapted to the mass production of many other Al products. Melted ingots are poured into horizontal bars of any desired length, then continuously rolled into ⅛-in. thick strip. Mechanized surface-preparation and painting installation. (C5, F23, L26, Al)

97-C. Removal of Impurities From Tin by Vacuum Distillation. J. W. Price. *Nature,* v. 169, May 10, 1952, p. 792.

Procedure to produce extremely pure tin. A specimen was heated in an evacuated silica tube at 1000° C. for 4 hr., after which spectrographic examination showed As, Sb, Pb, and Bi to be absent. A colorimetric method showed the As content to be less than 0.0002%. (C25, Sn)

98-C. Preparation of Silicon by Aluminothermic Methods. (In French.) Jean de Postis and Raymond Muraire. *Bulletin de la Société Chimique de France,* Mar.-Apr. 1952, p. 282.

Development of a laboratory procedure in which silica is reduced by a mixture of S and Al (C26, Si)

99-C. Magnesium Makers Take on Steam. *Canadian Chemical Processing,* v. 36, June 1, 1952, p. 34, 36-37.

Increase in Aluminum Co. of Canada's Mg production facilities, soon expected to be four times greater. Extraction processes.
(C general, Mg)

100-C. Is the Chemico Metals Technique Tomorrow's Metallurgy? Howard L. Waldron. *Engineering and Mining Journal,* v. 153, June 1952, p. 84-87, 176.

See abstract of "Chemical Ore Reduction Process May Pay Out in Three Years", *Chemical and Engineering News,* item 78-C, 1952.
(C general, B14, Ni, Co, Cu, Mn)

101-C. Advances in Extraction Metallurgy. Graham Oldham. *Mining Journal,* May 1952, p. 85-87.

Brief reviews for 1951 covering the following: Al, Cu, Ga, Ge, Au, Pb, Li, Mn, W, Zn, and Zr. 23 ref.
(C general)

102-C. Developments in Production of Alloys. A. E. Williams. *Mining Journal,* May 1952, p. 97-100.

A review for 1951 for the following alloys or alloy materials: alloy steels, Mn, Cu, bronzes, carbides, and Al-base alloys.
(C general, D general, AY, Mn, Cu, Al)

103-C. Modern Design Principles in Pyro-Processing. Part I. Heat Transfer Classifications, Pre-heating. Wolf G. Bauer. *Pit and Quarry,* v. 44, May 1952, p. 116-124, 126-127.

Equipment classification based on heat transfer principles. Design of equipment from a processing standpoint, rather than that of mechanics. Equipment is applicable to a wide variety of metallic and nonmetallic minerals. Flow diagrams and table. (To be continued.)
(C21, D general)

104-C. Why Doesn't Somebody Make a Long, Thin Ingot? L. M. Long. *American Foundryman,* v. 21, June 1952, p. 53.

The average brass and bronze ingot made today does not have the

most efficient area-to-mass ratio for heat transference. Describes a different shape that in actual tests has reduced melting time by an average of 14 min. per heat, with a proportionate savings in fuel and labor costs. (C5, Cu)

105-C. The Preparation of Rare Earth Metals. F. H. Spedding and A. H. Daane. *Journal of the American Chemical Society,* v. 74, June 5, 1952, p. 2783-2785.

In order to prepare highly pure rare-earth metals, a technique was devised whereby rare-earth chlorides are reduced by Ca in Ta crucibles; the resulting rare-earth metal is vacuum cast in Ta containers. Sa, Eu, and Yb chlorides are reduced only to their stable divalent state and can thus be efficiently removed from rare-earth mixtures by such processing. (C25, C26, EG-g)

106-C. New Chemical Method Recovers Nickel, Cobalt, Copper Metal. *Mining Engineering,* v. 4, June 1952, p. 565-567.

See abstract of "Chemical Ore Reduction Process May Pay Out in Three Years", *Chemical and Engineering News;* item 78-C, 1952. (C general, B14, Ni, Co, Cu, Mn)

107-C. (French) Relationship Between the Refining Process for Copper, and the Processing of Its Alloys. Marcel Cirou. *Fonderie,* May 1952, p. 2927-2937.

Melting and refining of copper; physical and chemical reactions of refining; and processing of the principal Cu alloys. Tables, graphs, and photographs. 16 ref. (C21, Cu)

108-C. Chemical Treatment of Molten Non-Ferrous Metals. Part 2. D. A. Dodson. *Canadian Metals,* v. 15, June 1952, p. 32-34.

Fluxing procedure, degassing, and grain refining of Al alloys; and, briefly, degassing and grain refining of Mg alloys. (C21, E25, Al, Mg)

109-C. Chemical Refining of Metals. *Chemical Engineering,* v. 59, June 1952, p. 164-168, 368, 370, 372-374, 376.

See abstract of "Chemical Ore Reduction Process May Pay Out in Three Years", *Chemical and Engineering News;* item 78-C, 1952. (C general, B14, Ni, Co, Cu, Mn)

110-C. Chlorination of Zirconium Oxide. W. W. Stephens and H. L. Gilbert. *Journal of Metals,* v. 4, July 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 733-737.

Production of anhydrous $ZrCl_4$ required as a starting material in the Kroll process for production of ductile Zr. It is produced by direct chlorination of a ZrO_2-C mixture in a silica-brick-lined chlorinator. Theory and thermodynamics of reactions. A pilot-model chlorinator and full-scale production equipment. Operating data. 10 ref. (C26, Zr)

111-C. The Cominco Suspension Roasting Process. K. D. McBean. *Mining Congress Journal,* v. 38, June 1952, p. 36-39, 84.

Process developed by Consolidated Mining and Smelting Co. of Canada, Ltd., Trail, B. C., for recovery and utilization of waste SO_2 gases. Operating refinements and changes in design reviewed and evaluated in light of latest requirements. Application has been largely to the Zn-roasting process, although experiments indicate applicability to roasting of other mineral sulfides, such as Pb and Cu concentrates, Cu mattes, and Sb sulfides, with the production of gases rich in SO_2 and efficient recovery of waste heat from the gases. The process has also been successfully used for calcination, or reoxidation, of iron oxide catalyst and for decomposition of $MnSO_4$ by use of supplemental fuel. (C21, A8)

112-C. Chemico Process Recovers Metals From Concentrate in a Few Hours. *Mining World,* v. 14, July 1952, p. 44-45.

See abstract of "Chemical Ore Reduction Process May Pay Out in Three Years", *Chemical and Engineering News;* item 78-C, 1952. (C general, B14, Ni, Co, Cu, Mn)

113-C. Another Aluminum Smelter in the Gulf Coast Region. *Modern Metals,* v. 8, June 1952, p. 64-66, 68.

The Reynolds Metals Co.'s new Al reduction works at San Patricio, Tex. (C21, Al)

114-C. (German.) Separation of Cadmium-Zinc Alloys by Vacuum Sublimation. Walter Scheller and W. D. Treadwell. *Helvetica Chimica Acta,* v. 35, no. 3, 1952, p. 745-753.

Experiments with high-purity Zn-Cd alloys revealed an additional point on the solidus of the Cd-rich solid solution at 250° C. Dezincification of a Zn-poor Cd alloy with steam at 400° C. showed that the process proceeds rapidly until the Zn content is reduced to 0.0035%. Diagrams, tables, and graphs. 12 ref. (C25, Cd, Zn)

115-C. (German.) New Developments in Continuous Casting. Otto Schaaber. *Zeitschrift für Metallkunde,* v. 43, May 1952, p. 181-190.

Reviews continuous casting on the basis of the literature, particularly

factors responsible for difficulties, the casting properties of steel, Cu, and Al. New-type installations for continuous casting of nonferrous metals and steel. Schematic drawings. 41 ref. (C5, D9, ST, Cu, Al)

116-C. (Russian.) **A New Method of Separating Eutectic Alloys.** S. I. Drakin. "Izvestiia Sektora Fiziko-Khimicheskogo Analiza", v. 20 (Academy of Sciences of the USSR), p. 341-344.

Crystallization of binary alloys under the influence of an electrical current is proposed as a means of separating the components. Data are charted for Sn-Bi and Cd-Bi alloys. (C28, Sn, Cd, Bi)

117-C. Sterling Furnace Smelts Zinc With Electric Arc. *Engineering and Mining Journal,* v. 153, July 1952, p. 76-78.

New Jersey Zinc Co.'s patented Sterling Process. Includes flow-sheet and furnace diagrams. (C21, Zn)

118-C. (Book) **The Principles of Extraction and Refining of Metals.** 102 pages. Institution of Metallurgists, 4 Grosvenor Gardens, London, S.W. 1. 12s. 6d.

A record of the 1950 Refresher Course. Five lectures are covered: "Physical Chemistry and its Use in Extraction Operations," A. J. E. Welch; "The Place of Mineral Dressing Extraction Metallurgy," E. J. Pryor; "Principles of Ore Reduction," C. W. Dannat; "Fundamentals of the Production of Metal and Alloy Ingots," L. Northcott; and "Principles Underlying Refining Processes," F. D. Richardson. (C general, D general, B general)

119-C. How High Vacuum Aids Metalworking. Frank Charity. *American Machinist,* v. 96, July 21, 1952, p. 102-103.

How modern equipment makes high vacuum a practical production tool. Applications include inert-atmosphere sintering, heat treating, brazing, or melting; impregnation or sealing of castings, etc., packaging in airtight containers; and application of metallic coatings. Diagram and illustrations. (C25, E25, J general, K8, L general)

120-C. Calculated Energy Requirements of Electric Furnace Products. Gordon R. Finlay. *Chemistry in Canada,* v. 4, Feb. 1952, p. 25-28.

Minimum requirements of power are calculated for fusion of oxides and for synthesis of carbides. Previously published data on silicon carbide are revised and corrected. Energy required in kwh. per lb. of product for fusion of Al_2O_3, MgO, and ZrO_2; for the purification of Al_2O_3 from bauxite and ZrO_2 from zircon sand; and for synthesis of TiC, ZrC, B_4C, SiC and ferrosilicon from the appropriate oxides. 17 ref. (C21)

121-C. Researches on Nickel Converter Practice. *Mining Journal,* v. 239, July 4, 1952, p. 13-14.

Different converter procedures, variations in handling nickel and cupronickel matte, and electrically heated converters. (C21, Ni)

122-C. (French.) **New Method for Pyrometallurgical Recovery of Metals of the Rare-Earth Group.** C. Decroly, J. Van Impe, and D. Tytgat. *Revue de Métallurgie,* v. 49, June 1952, p. 458-462.

Experimental technique. Separation of oxides and reduction of fluorites of rare earths. Data are tabulated. 10 ref. (C21, EG-g)

123-C. (German.) **The Use of Gas in the Heating of Light-Metal Furnaces.** A. Roth and H. W. Fulda. *Giesserei,* v. 39, June 2, 1952, p. 315-317.

Role in production of Al. Various technical advances, such as continuous casting, with reference to their effect on use of gas for heating the furnaces. Suggestions for the most economical use of this fuel. (C21, C5, Al)

124-C. Ion Exchange Separation of Rhenium From Molybdenum. S. A. Fisher and V. W. Meloche. *Analytical Chemistry,* v. 24, July 1952, p. 1100-1106.

Describes method of Re recovery which is 99±3% complete. Ion exchange provides a means by which Re is not only separated from Mo but also concentrated and recovered in a form easily converted to a useful crystalline compound. The method is also readily adaptable to colorimetric determination. Graphs and tables. 14 ref. (C28, S11, Re)

125-C. El Paso Refinery of Phelps Dodge Refining Corporation. B. B. Kunkle. *Mines Magazine,* v. 62, July 1952, p. 25-29, 59.

Electrolytic copper refinery. Flow sheet and details of equipment and procedures, including casting of anodes, bars, and ingots. (C23, Cu)

126-C. Cyanidation. Albert L. Pierce. *Mines Magazine,* v. 62, July 1952, p. 33-39.

Details of process used in production of gold and silver. Many of the techniques and machines developed for the cyanide process have been adapted to the hydrometallurgy of other metals, chemical processes, sewage disposal, water handling, and even flotation. Includes chem-

istry as well as mechanical features of the process. Schematic diagrams. (C24, Au, Ag)

127-C. Horizontal or Vertical Retorts For Zinc Distillation? C. W. Jensen. *Mining Magazine,* v. 88, July 1952, p. 20-23.

Reviews the case for replacement of the old horizontal retort. (C22, Zn)

128-C. (French.) The Direct Production of Tungsten Monocarbide, WC, From Tungsten Ore. André Chrétien, William Freundlich, and Francois-André Josien. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, June 30, 1952, p. 2608-2609.

Method in which a common tungsten ore known as wolframite is heated with carbon followed by treatment with hydrofluoric acid and aqua regia. This method is claimed to be very simple and rapid. Graphs. (C4, W, C-n)

129-C. Titanium Dioxide Out of Quebec. C. V. Hotson. *Canadian Metals,* v. 15, July 1952, p. 18-19.

See abstract of "Chemistry Tackles Titanium," *Canadian Chemical Processing,* item 130-C, 1952. (C21, B12, Ti)

130-C. Chemistry Tackles Titanium. C. V. Hotson. *Canadian Chemical Processing,* v. 36, June 1, 1952, p. 30-31.

Production, at Quebec Iron and Titanium Corp., Sorel, Quebec, of a high-TiO_2-content slag for paint manufacture. Mining and smelting operations. Possibility of Ti metal production. (C21, B12, Ti)

131-C. (Book—Russian.) Metallurgiia Magniia (The Metallurgy of Magnesium) Kh. L. Strelets, A. Iu. Taits, and B. S. Gulianitskii. 491 pages. 1950. Government Scientific-Technical Publishing House for Literature on Ferrous and Nonferrous Metallurgy, Moscow, U.S.S.R.

Characteristics of the raw material used for obtaining magnesium, theoretical bases of the extractive metallurgy of magnesium, and the technology of its production by electrolytic and thermal methods. (C23, C21, Mg)

132-C. Progress in Titanium Research. The Search for Cheaper Production Methods. *Chemical Age,* v. 67, Aug. 2, 1952, p. 157-160.

Brief discussion, primarily on current work on Ti production, at England's National Physical Laboratory. (C general, Ti)

133-C. The Reduction of Nickel Oxide in a Fluidized Bed. Arnold Kivnick and A. Norman Hixson. *Chemical Engineering Progress* (Engineering Section), v. 48, Aug. 1952, p. 394-400.

Experiments involving rate of reduction of finely divided solid nickel oxide with hydrogen. Results indicate that both a kinetic-reaction step and a diffusional, or mass-transfer step affect the over-all reaction rate. The process may find industrial use for preparing pure Ni from the oxide. The product at the end of one run was found to be 75% metallic Ni. 30 ref. (C2, Ni)

134-C. Republic Steel: New Titanium Producer. V. W. Whitmer and T. E. Perry. *Iron Age,* v. 170, Aug. 21, 1952, p. 117-122.

Republic Steel is now in commercial production of pure Ti and two Ti alloys. They are producing ingots both by arc and induction melting and are marketing the product as bars, strip, plate sheet, and forgings. Arc-melting furnace is diagrammed. Mechanical properties are charted and tabulated. Includes photomicrographs. (C21, Q general, M27, Ti)

135-C. (French.) Quantitative Study of the Reductive Melting of Ilmenite. William Freundlich. *Bulletin de la Société Chimique de France,* May-June, 1952, p. 490-501.

Factors to be considered when reducing ilmenite by melting in the presence of NaOH at elevated temperatures, separating Fe from Ti by forming a melt and slag at the liquid phase. The theoretical basis of such reduction, the role of carbon, the formation of slag, and practical interpretation of the results. Tables and graphs. 14 ref. (C4, Fe, Ti)

136-C. (French.) Söderberg Electrodes and Their Influence on the Construction of Electric Smelting Furnaces. *Journal du Four Electrique et des Industries Electrochimiques,* v. 61, Mar.-Apr. 1952, p. 39-44; May-June 1952, p. 72-77.

Various structural details of the electrodes. Their role in electric furnaces. Diagrams and photographs. (C21)

137-C. (French.) A New Process for the Production of Aluminum: The Loewenstein Process. D. Ménégoz and P. Belon. *Journal du Four Electrique et des Industries Electrochimiques,* v. 61, May-June 1952, p. 79-82.

New French electrolytic process which makes use of induction heating and vacuum volatilization. Its chemistry. Diagrams and illustrations. (C23, Al)

138-C. (German.) The Melting of Cuprous Oxide and its Mixtures With Other Oxides. E. J. Kohlmeyer. *Metall,* v. 6, Aug. 1952, p. 427-429.

A review on the basis of the literature. In particular, work done with

copper oxides alone, with Cu_2O, CuO, and SiO_2, with Cu_2O in Ag_2O, mixtures and molecular compounds with PbO, ZnO, CaO, NiO, Ni_2O_3, Sb_2O_3, Ag_2O, etc. Results should be useful in recovery of Cu from its ores. 10 ref. (C21, Cu)

139-C. (German.) **Present Developmental Tendencies in the Fire Refining of Copper.** O. Nielsen. *Metall,* v. 6, Aug. 1952, p. 429-431.

Historical development leading to processes used at present, such as electric melting and desulfurization process for Cu developed by the author. (C21, Cu)

140-C. (German.) **The Elimination of Oxygen, Sulfur, and Gases From Remelted Alloys by Means of Lithium.** E. R. Thews. *Metall,* v. 6, Aug. 1952, p. 431-433.

Reviews previous methods for refining of remelted Cu alloys on the basis of the literature. Mechanism of the effect of Li additions. 25 ref. (C21, Cu, Li)

141-C. (German.) **The Present State of the Electrometallurgy of Nonferrous Metals.** Georg Eger. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 5, July 1952, p. 270-276.

The role of electrometallurgy in the production of Cu, noble metals, Pb, Zn, Sn, Mn, Cr, Ca, Ni, Co, Al, and Mg. Basic research. Power supply problems. Diagrams. (C28, EG-a)

142-C. (Italian.) **Anodic Carbon Consumption During Industrial Electrolysis of Aluminum.** R. Schadinger. *Alluminio,* v. 21, June 1952, p. 252-256.

Analyzes theoretical relationships among current efficiency, carbon consumption, and anodic gas consumption. Develops formulas for calculation of relationship between theoretical and actual carbon consumption in specific cases. An important fraction of the carbon is consumed by extraneous processes and not by the electrolysis itself. (C23, Al)

143-C. Now—Arc Furnace Zinc. *Chemical Engineering,* v. 59, Aug. 1952, p. 246-248.

Temperature is controlled well enough for smelting Zn in an electric arc furnace. Zn vapor quickly quenched, liquefied with novel condenser. Diagrams. (C21, Zn)

144-C. Moving in on Manganese. *Chemical Week,* v. 71, Sept. 13, 1952, p. 59-63.

Merits of two new processes for obtaining Mn from domestic ores. Includes cost analysis.
(C21, B general, A4, Mn)

145-C. Monterrey Refinery Uses Continuous Lead Softening and Desilverizing Process. G. Ross and S. A. Peabody. *Journal of Metals,* v. 4, Sept. 1952, p. 915-918.

Method compared with Parkes process. Decopperizing, dezincing, and debismuthizing operations. Parting plant. (C21, C28, Pb, Ag, Zn, Bi)

146-C. Developments in Refractories for Smelting Non-Ferrous Ores. W. H. Dennis. *Mine & Quarry Engineering,* v. 18, Aug. 1952, p. 252-258; Sept. 1952, p. 283-285. (Conclusion)

Includes tabular data on physical and chemical properties of various types, also diagrams of some roasting, smelting, and refining equipment. (C21, EG-a)

147-C. (French.) **The Preparation of Silicon-Titanium Alloys by Molten-Salt Electrolysis.** Maurice Dodero. *Journal de Chimie Physique et de Physico-Chimie Biologique,* v. 49, June 1952, p. C11-C14; disc., p. C14.

Electrolysis of alkaline and alkaline-earth silicates with addition of TiO_2, electrolysis of potassium fluosilicate with additions of TiO_2, and production of Si-Ti alloys. Graphs. (C23, Si, Ti)

148-C. (Book.) **Grundriss der Technischen Chemie. Teil III. Technische Elektrochemie und Metallurgie.** (Outline of Technical Chemistry, Part III. Technical Electrochemistry and Metallurgy.) Carl Kröger. 167 pages. 1951. Vandenhoeck and Ruprecht, Göttingen, Germany. 12.80 DM.

Deals with technical electrochemistry in 58 pages and 29 diagrams, and with extraction metallurgy of ferrous and nonferrous metals in 104 pages and 130 diagrams. Includes electrolysis of fused salts; melting, alloying, and heat treatment; aqueous extraction metallurgy; slag reactions and oxidation; reduction processes; gas-solid equilibria. (C23, D8)

149-C. Chemical Refining of Metals. *Western Machinery and Steel World,* v. 43, Sept. 1952, p. 89-90.

See abstract, "Chemical Ore Reduction Process May Pay Out in Three Years." *Chemical and Engineering News,* item 78-C, 1952.
(C general, B14, Ni, Co, Cu, Mn)

150-C. Acid-Leaching Oxidized Ores Offers New Source of Nickel. George W. Pawel. *Engineering and Mining Journal,* v. 153, Oct. 1952, p. 94-95.

Use of HCl on silicate ores to recover nickel. (C4, Ni)

151-C. Aspects of the Continuous Casting of Non-Ferrous Metals. Part I. Experimental Casting Unit for Small Ingots. B. H. C. Waters. *Metal Treat-*

ment and Drop Forging, v. 19, Sept. 1952, p. 379-384.

Tables and diagrams. (To be continued.) (C5, EG-a)

152-C. Non-Ferrous Metals: Extraction and Refining. G. L. Evans. *Reports on the Progress of Applied Chemistry,* v. 36, 1951, p. 278-291.

Review of progress in 1951. Extraction, refining, mineral dressing and, briefly, economics. Numerous references.
(C general, B general, A4, EG-a)

153-C. Malleable Chromium and Its Alloys. H. L. Gilbert, H. A. Johansen, and R. G. Nelson. *U. S. Bureau of Mines,* Report of Investigation 4905, Sept. 1952, 22 pages.

Improvements in production of high-purity Cr metal by Mg reduction of anhydrous chlorides and by hydrogen treatment of electrolytic chromium. Hydrogen-treated Cr was arc-melted, and the arc-melted material has been successfully forged, rolled, and swaged. Results of X-ray and metallographic studies. Heat resistance of Cr. Graphs, tables, diagrams, photographs, and micrographs. (C26, C23, F22, F23, M27, Cr)

154-C. (French.) The Role of Silicon and Iron in the Reduction of Zinciferous Charges. Eugéne Frenay. *Revue de Métallurgie,* v. 49, Aug. 1952, p. 567-572.

Influence of molecular composition on reducibility. Effects of Si and Fe content. Data are tabulated and charted. (C21, Zn)

155-C. (German.) Fundamental Principles of the Chlorine-Nitrogen Refining Process. Wilhelm Dautzenberg. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 5, Aug. 1952, p. 308-310.

Practical considerations in applying the process in Al refining.
(C4, Al)

156-C. The Technology of Titanium. Robert I. Jaffee and John M. Blocher, Jr. "Resources for Freedom. Vol. IV. The Promise of Technology" (U. S. Govt. Printing Office, Washington), 1952, p. 65-81.

Extractive processes, reduction of process costs, means of improving performance, use as a substitute metal and future prospects. 26 ref. (C general, T general, Ti)

157-C. Electrolytic Zinc Plant at Monsanto, Illinois. T. I. Moore and L. A. Painter. *Journal of Metals,* v. 4, Nov. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 1149-1159.

Advances during the past 11 years at this plant include leaching, clarification and residue treatment, purification, Cd recovery; operations in the electrolysis department, cell room, power-conversion equipment, cathode melting, the casting operation, furnace oxide recovery, and furnace dross handling. Tables, photographs, and diagrams.
(C23, Zn, Cd)

158-C. Separation of Lead, Cadmium, and Germanium Sulfides From Zinc Sulfide Concentrates. H. Kenworthy and J. S. Absalom. *U. S. Bureau of Mines,* Report of Investigations 4876, May 1952, 7 pages.

Methods and conditions under which metallic sulfides with boiling points lower than sphalerite may be removed from ZnS concentrates by volatilization. Results show that, under proper conditions, it is possible to remove over 90% of the Pb, Cd, and Ge as an enriched sublimate. Diagram.
(C28, Pb, Cd, Ge, Zn)

159-C. (German.) Research on the Nature of Earing in Continuously Cast Pure Aluminum. H. Hug, G. Siebel, and P. Buser. *Metall,* v. 6, Oct. 1952, p. 579-586.

Experiments made to study the effect of casting and processing conditions. Photographs, diagrams, and graphs. (C5, Al)

160-C. (German.) The Formation of the Cuprous Oxide-Rich Surface of Horizontally Cast Copper Wire Bars Cooled in Air. Paul Klare. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 5, Sept. 1952, p. 350-353; disc., 353-354.

Experiments made to explain the reason for the high Cu_2O content of the surfaces of Cu bars cast by different methods. Photographs, diagrams, tables, and graphs. (C5, Cu)

161-C. The Separation of the Anhydrous Chlorides of Iron and Aluminium by Formation of Graphite Complexes. R. C. Croft. *Journal of Applied Chemistry,* v. 2, Oct. 1952, p. 557-562.

Possibility of separation of $FeCl_3$ and $AlCl_3$ by heating the mixtures with graphite was investigated. Stabilities of the complexes formed were studied. It was concluded that separation is feasible and of possible value in industrial chlorination of ferruginous Al ores. (C28, Al)

162-C. The Reaction Between Ferric Oxide and Anhydrous Aluminium Chloride. R. C. Croft. *Journal of Applied Chemistry,* v. 2, Oct. 1952, p. 562-565.

Theoretical and experimental investigations. Possible application to removal of Fe from ferruginous bauxite. (C28, Al)

163-C. Reverberatory Campaigns Increased—Hot Patching Practice at McGill Smelter. Edward Pesout. *Journal*

of Metals, v. 4, Aug. 1952, p. 815-818.

Practice prior to 1939 was to operate reverberatory furnace until a hot spot or a thin section developed in the furnace arch. The furnace would then be shut down and arch and corresponding sidewall replaced. With increased copper demand, and reduction of available labor because of selective-service requirements, hot-patching method was initiated to instrument a more continuous operation. Hot-patch compositions, and methods and equipment for application. Diagrams. (C21, Cu)

164-C. Observations on the Preparation of Iodide Titanium. O. J. C. Runnalls and L. M. Pidgeon. *Journal of Metals,* v. 4, Aug. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 843-847.

Kinetics of iodide process. Deposition rate is geometry-sensitive in a system containing a finely divided Ti charge. Results indicate that iodine diffusion rate influences velocity of the process. Nonvolatile iodide, TiI_3, forms in hot filament zone, thus removing iodine from the cycle. Diagrams, graphs, and illustrations. 10 ref. (C4, Ti)

165-C. Decarburization of High Carbon Cobalt Metal. John H. Dismant, J. Hugh Hamilton, W. Martin Fassell, and John R. Lewis. *Journal of Metals,* v. 4, Aug. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 884.

Use of two methods for preparation of low-C metallic Co from precipitated Co oxides. Carbon reduction of the oxides took place in a 3-phase electric-arc furnace. In one method CO_2 was bubbled through molten Co. In the other, molten Co was maintained in a CO_2 atmosphere. Data tabulated. (C21, Co)

166-C. Two Laboratory Furnaces for Melting Titanium Alloys. J. A. Rees. *Metallurgia,* v. 46, Oct. 1952, p. 186-190.

Construction of furnaces (vacuum vertical graphite-resistor type and arc type). Schematic diagrams and photographs. (C21, Ti)

167-C. Continuous Casting of Non-Ferrous Metal. Part II. Experimental Casting Techniques Employed for Various Metals. B. H. C. Waters. *Metal Treatment and Drop Forging,* v. 19, Oct. 1952, p. 433-438.

Causes of various phenomena associated with continuous casting of metals. Effects of casting rate, mold surface and shape, and solidification rate. Techniques used to continuously cast Pb, Zn, Al, Cu, cast iron, steel, and Bi-Sn eutectic alloy. (To be continued.) (C5, D9)

168-C. Cobalt Refining at Nkana, Northern Rhodesia. *Mining Journal,* v. 239, Oct. 24, 1952, p. 455-456. (Reprinted from *Rhokana Review,* v. 1, Nos. 11-12)

Varying stages of cobalt purification at Nkana. Processes used at the company's new plant. (C21, Co)

169-C. The Lubumbashi Smelter at Elisabethville, Belgian Congo. *Mining Journal,* v. 239, Oct. 31, 1952, p. 486-487. (Reprinted from *Chemical Engineering and Mining Review* (Australia).

Sintering; slag disposal; blister casting; and gas, dust and fume recovery at above Cu smelter. Flow diagram. (C21, Cu)

170-C. The Extraction and Possible Uses of Rhenium. Graham Oldham. *Mining Journal,* v. 239, Oct. 31, 1952, p. 488-489.

History, extraction, and possible uses. (C general, T general, Re)

SECTION D

FERROUS REDUCTION and REFINING

1-D. Internal Structure of Killed Steel Ingots on the Basis of Relative Rates of Solidification. Edward A. Loria. *Blast Furnace and Steel Plant.* v. 39, Nov. 1951, p. 1333-1337.

Proposals for controlling the internal soundness and segregation of killed steel ingots on the basis of relative rates of solidification. Effects of the four components of heat abstraction during solidification, and possible changes in mold design in terms of accelerating vertical solidification. (D9, N12, CN)

2-D. Practical Consideration of Open Hearth Bottom Construction. Philip A. Gaebe. *Blast Furnace and Steel Plant,* v. 39, Nov. 1951, p. 1338-1347.

Methods of installation, materials used and their costs, and systems employed to record such information for openhearth furnace bottom rebuilds. (D2, ST)

3-D. J & L Pours First Steel From New Melt Shop. *Iron and Steel Engineer,* v. 28, Nov. 1951, p. 122, 124, 125.

Features of new Jones and Laughlin Steel Corp. plant include latest developments in openhearth furnace design and use of refractories; instrumentation for high efficiency in the control of temperatures; heat and efficiency of fuel utilization; mechanized material-handling facilities; provisions for using tar, oil, or gas for fuel; and special facilities for handling scrap. (D2, ST)

4-D. Discussion on the Paper—"The Reduction of Lump Ores", R. Wild and H. L. Saunders. *Journal of the Iron and Steel Institute,* v. 169, Oct. 1951, p. 110-113.

Paper published in v. 165, 1950. See item 193-D, 1950. (D1, Fe)

5-D. Joint Discussion on the Papers —"The Distribution of Temperature in Ingot Moulds and Its Relation to Ingot Structure," I. M. Mackenzie and Andrée Donald; **"Ingot Heat Conservation; Time Studies From Casting to Rolling",** A. V. Brancker, J. Stringer, and L. H. W. Savage; and **"Ingot Heat Conservation; Mould and Ingot Surface Temperature Measurements,"** A. V. Brancker. *Journal of the Iron and Steel Institute,* v. 169, Oct. 1951, p. 113-117.

Papers published in v. 166, 1950, p. 19-28; v. 164, 1950, p. 68-84; and v. 165, 1950, p. 307-313; respectively. See items, 273-D, 22-F, 219-D, 1950. (D9, N12. F21, ST)

6-D. Joint Discussion on the Papers— "The Thermodynamic Background of Iron and Steel Making Processes. II. Deoxidation". F. D. Richardson; and **"Studies in the Deoxidation of Iron; Deoxidation by Aluminium",** H. A. Sloman and E. Ll. Evans. *Journal of the Iron and Steel Institute,* v. 169, Oct. 1951, p. 118-125.

Papers published in v. 166, Oct. 1950, p. 137-146; and v. 165, May, 1950, p. 81-90; respectively. See items 358-P and 166-D, 1950. (D general, P12, ST)

7-D. Discussion on the Paper— "Thermodynamic Aspects of the Movement of Sulphur Between Gas and Slag in the Basic Open-Hearth Process", F. D. Richardson and G. Withers. *Journal of the Iron and Steel Institute,* v. 169, Oct. 1951, p. 125-127.

Paper published in v. 165, 1950. See item 165-D, 1950. (D2, B21, ST)

8-D. Studies in the Deoxidation of Iron; Deoxidation by Manganese. H. A. Sloman and E. El. Evans. *Journal of the Iron and Steel Institute,* v. 169, Oct. 1951, p. 145-152.

Preparation, analysis, and microscopical examination of a series of ingots, made by adding O_2 and Mn to 300-400-g. melts of pure iron. Analyses include estimations of the total O_2 and Mn contents of the ingots, and chemical and X-ray analyses of the nonmetallic inclusions obtained by alcoholic-iodine extraction. Microscopical appearance of the in-

clusions in polished metal sections. The alcoholic-iodine method is shown to be unsatisfactory for the quantitative extraction of inclusions with a high MnO content. A new calculation of equilibrium conditions for deoxidation by Mn using previously published data. 17 ref. (D general, Fe)

9-D. Melting and Sintering of Metals in Vacuo. E. D. Malcalm. *Journal of Scientific Instruments,* Supplement 1, 1951, p. 63-66.

Advantages and application. The various problems peculiar to the use of a furnace in a vacuum enclosure, and the design of such a furnace suitable for melting 50-100 lb. of steel. (D8, ST)

10-D. Operation and Control of an All-Basic Open Hearth Furnace. F. Mitton. *Refractories Journal,* v. 27, Oct. 1951, p. 410-420.

In addition to being an all-basic construction, furnace is also a single uptake furnace, operated with a charge control system, and with automatic control of fuel. (D2, ST)

11-D. The All-Basic Open Hearth. Part II. R. P. Heuer and M. A. Fay. *Refractories Journal,* v. 27, Oct. 1951, p. 423-428.

A comparison is made with American furnaces. Some performance data. (D2, ST)

12-D. Improved Feeder-Head Tile for Ingot Hot Tops. H. O. Howson. *Metal Progress,* v. 60, Nov. 1951, p. 88-90.

Materials used. Development of recessed tiles and their application to mass production steelmaking. (D9, ST)

13-D. Steel Density Controlled. *Steel,* v. 120, Dec. 10, 1951, p. 123.

Methods for producing finished and semifinished steel products having any desired density and analysis within a wide range. Dry, prepared iron ore, generally finer than 60 mesh, is poured directly into suitable molds, reduced at 2000° F. and held for several hours at this temperature. Resultant article has the composition and structure of normal steel except that it contains a predetermined amount of spherical voids which are not interconnected. (D8, ST)

14-D. What Are Present Limits to Electric Furnace Size? J. L. Bray. *Iron Age,* v. 168, Dec. 13, 1951, p. 127-130.

Barring unforeseen electrical developments, arc furnaces for steel melting will probably be built in sizes smaller than 150-ton units. Furnaces will be better but physical and electrical factors will limit size. When current transmitted is greatly increased, losses become disproportionately great. (D5)

15-D. J & L Dedicates 2 Million Ton Open Hearth Shop. *Journal of Metals,* v. 3, Dec. 1951, p. 1126-1127.

Described and illustrated. (D2, ST)

16-D. Modern Trends in Electric Furnace and Transformer Design. R. J. McCurdy. *Journal of Metals,* v. 3, Dec. 1951, p. 1130-1132.

Confined to electric furnaces and auxiliary equipment for use in steelmaking. (D5, ST)

17-D. A Survey of the Sulphur Problem Through the Various Operations in the Steel Plant. T. E. Brower and B. M. Larsen. *Journal of Metals,* v. 3, Dec. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1163-1171.

Surveys the steel-plant sulfur-distribution and elimination problem from coal to liquid steel ready for teeming, giving distributions of sulfur over a range of coke sulfur content; some methods of sulfur control in the blast furnace, external desulfurization between blast furnace and openhearth; distribution between fuel, slag, and metal; and methods and limitations of control of sulfur in the openhearth. 12 ref. (D1, D2, ST)

18-D. Flow Patterns in Furnaces. J. H. Chesters. *Coke and Gas,* v. 13, Nov. 1951, p. 391-394, 398. (Based on papers in *Journal of the Iron and Steel Institute,* 1949.)

See abstract from *Chemistry & Industry,* item 225-D, 1951. (D2, ST)

19-D. Using Gases in Metal Production. E. Spire. *Canadian Metals,* v. 14, Nov. 1951, p. 10-12.

New type of ladle in which gases are introduced through a porous refractory plug. It is used for degassing, desulfurization, and similar treatments. (D9, C5)

20-D. Quality Control in Basic Electric Steel Making Practice. A. F. J. Edgerton. *Australasian Engineer,* Oct. 8, 1951, p. 74-81.

The basic principles of steelmaking and furnace operation. Materials used and effects of alloying elements added to the liquid steel in the light of specification requirements. Deals more specifically with Ni-Cr-Mo steels. (D5, AY)

21-D. Chemistry in Metal Extraction. F. D. Richardson. *Engineering,* v. 172, Nov. 2, 1951, p. 569-572.

Effects of physical chemistry and research on ferrous and nonferrous metal extraction. Current possibilities which may become important. Major emphasis is on ferrous reactions. (D general, C general, Fe, ST)

22-D. Influence of Vacuum Melting on the Properties of 25% Chromium Ferrites. (In French.) J. Hochmann. *Revue de Métallurgie,* v. 48, Oct. 1951, p. 734-758; disc., p. 758.

The action of vacuum remelting made under well-defined conditions on certain properties of 25% chromium ferritic stainless steels. Degasification conditions, charge composition, hydrogen content, and synthetic casting techniques. Influence on properties with respect to friction, shock resistance, and intercrystalline corrosion after treatment at 900-1200° C., and with respect to hardening, brittleness, and intergranular corrosion after heating between 400 and 500° C., was investigated. 39 ref. (D8, Q general, R2, SS)

23-D. Use of Pulverized Lime for the Desulfurization of Molten Pig Iron. (In French.) **I. Tests Made in a 3-Ton Furnace.** B. Kalling, C. Danielsson, and O. Dragge. **II. Industrial Practice.** S. Fornander. *Circulaire d'Informations Techniques,* v. 8, no. 10, 1951, p. 1119-1140. (Translated from *Jernkontorets Annaler.)*

Previously abstracted from original. See item 241-D, 1951. (D1, Fe)

24-D. Metallurgy and Economics of Oxygen Enrichment in the Blast-Furnace Process. (In German.) Rudolf Graef. *Stahl und Eisen,* v. 71, Nov. 8, 1951, p. 1189-1198; disc., p. 1198-1199.

Reviews and correlates the literature. Results of experimental investigation of various aspects such as reduction of nitrogen content of bessemer steel, reduction of phosphorus content and of blowing time; possibility of refining low-phosphorus pig iron, and improvement of converter life. Disadvantages; preliminary slag refinement for recovery of V and Mn. 23 ref.
(D1, D3, ST, V, Mn)

25-D. Use of Oxygen in the Basic Openhearth Furnace. (In German.) Kurt Heinrich. *Stahl und Eisen,* v. 71, Nov. 8, 1951, p. 1199-1204.

Enrichment of the combustion air in gas producers to 23.5% O_2 and increase of the calorific content of the gas to 1530 cal. per cu. m. Advantages and disadvantages, including economic factors.
(D2, ST)

26-D. Use of Oxygen-Enriched Air in the Openhearth Furnace and in the Gas Producer. (In German.) Wilhelm Baumgardt. *Stahl und Eisen,* v. 71, Nov. 8, 1951, p. 1204-1211; disc., p. 1211-1212.

Reviews the literature; tabular and graphical data. Advantages, particularly for short furnaces, because of reduced flame length. 21 ref.
(D2, ST)

27-D. The Stürzelberg Process for Production of Pig Iron. (In German.) H. Reinfeld. *Giesserei,* v. 38, Oct. 4, 1951, p. 517-523.

New process of producing pig iron from iron pyrites. The problem, complicated by the presence of up to 10% Zn and 4-7% S, was solved by application of a short rotary reducing furnace. Advantages and drawbacks. Properties of resulting pig iron. (D8, Fe)

28-D. Theory of Heat Transfer in Openhearth Furnaces and Its Consequences. (In Czech.) Antonin Benda. *Hutnické Listy,* v. 6, Sept. 1951, p. 433-439.

Relationships of heat consumption, thermal efficiency, and heat losses to furnace efficiency. The amount of heat transferred during melting, also effective gas-volume regulation. With the aid of theoretical calculations, general equations for minimum melt time and maximum furnace efficiency are derived. The equation of thermal characteristics is used to deduce the relation of specific consumption of heat to furnace size. (D2, ST)

29-D. Production of Sponge Iron in Metal Containers. (In Portuguese.) Fernando A. de Toledo Piza. *Boletim da Associacao Brasileira de Metais,* v. 7, July 1951, p. 240-246.

Possibility of shortening the production cycle of sponge iron by the Swedish Höganäs process was studied, in order to reduce the size of equipment. (D8, Fe)

30-D. (Book) **The Making, Shaping and Treating of Steel.** Ed. 6, 1951. U. S. Steel Co., Pittsburgh. 1584 pages.

The scope and appearance of this edition is about the same as the 5th edition printed in 1940 under authorship of C. B. Francis, although the text has been either rewritten or drastically edited by "cooperative efforts of numerous authors, editors and reviewers". The wordage is increased 15% and it contains a 150-page index. It is far more than a statement of Steel Corporation practices; it is a systematic statement of the metallurgy of iron and steel mill products as of today. Heat treatment is fully treated, but fabrication problems are not. As an indication of the broadened scope the following new subdivisions in the chapter on bessemer process may be noted: economic considerations; oxygen enriched blast; temperature control.
(D general, F general, J general, ST)

31-D. Multiple Burners in Open Hearth Furnaces. H. T. Watts. *Iron and Steel Engineer,* v. 28, Dec. 1951, p. 102-107.

Variables affecting performance. Various burner designs. (D2)

32-D. Jet Tapper Practice at the Open Hearth. A. Robert Almeida and Harold Walker. *Iron and Steel Engineer,* v. 28, Dec. 1951, p. 108-109. (A condensation)

Some operating results obtained at Republic Steel Corp., Warren, Ohio. Advantages of using this explosive charge. (D9, D2)

33-D. Ladle Refractories and Practice in Acid Electric Steel Foundry. Clyde H. Wyman. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 546-553; disc., p. 553-554.

Previously abstracted from Preprint 64. See item 173-D, 1951. (D9)

34-D. The Testing of Steelplant Refractories. *Refractories Journal,* Nov. 1951, p. 459-463.

Problems encountered. Data on blast furnaces, openhearth furnaces, reheating furnaces, and soaking pits. (D1, D2, F21)

35-D. Recent Technical Progress in Basic Steel Furnace Refractories. Part III. F. I. Cordwell. *Refractories Journal,* Nov. 1951, p. 467-475.

Chemical composition of dolomite. Work done to obtain a dolomite inert to the humidity of the air and to recarbonation. (D5, B19)

36-D. Oxygen-Carbon Equilibrium in Steel. (In French.) M. Rocquet. *Circulaire d'Informations Techniques,* v. 8, Nov. 1951, p. 1265-1279.

A comparison of various results obtained in the openhearth and an examination of different methods for determining the amount of O_2 in steel. 14 ref. (D2, S11, ST)

37-D. Contribution to the Metallurgy of Chromium in Basic Steelmaking Processes. (In German.) Erwin Plöckinger. *Archiv für das Eisenhüttenwesen,* v. 22, Sept.-Oct. 1951, p. 283-293.

A review on the basis of the literature. Data are compared and systematized. 32 ref. (D2, D3, D5, ST)

38-D. The Blowing Losses in Smoke From Basic Lined Converters. (In German.) Werner Pepperhoff and Franz Zirm. *Archiv für das Eisenhüttenwesen,* v. 22, Sept.-Oct. 1951, p. 295-297.

An optical method for determining the amount of iron lost in brown converter smoke. Details of the tests, done with an electron microscope. Vapor pressure and absorption capacity of iron were investigated. 10 ref. (D3, ST)

39-D. Bottom Casting of Ingots for the Manufacture of Plates. T. T. Watson. *Blast Furnace and Steel Plant,* v. 39, Dec. 1951, p. 1471-1475, 1491.

Hazards in the practice that must be avoided, such as break-outs and defective refractories. (D9, ST)

40-D. Multiple Burners in Open Hearth Furnaces. H. T. Watts. *Blast Furnace and Steel Plant,* v. 39, Dec. 1951, p. 1484-1491.

Variables which affect operation. Performance data and diagrams. (D2, ST)

41-D. Steel Flows From Jones & Laughlin's $70,000,000 Open Hearth Furnace Addition. *Blast Furnace and Steel Plant,* v. 39, Dec. 1951, p. 1492-1495.

Features of the new plant include latest developments in openhearth-furnace design and use of refractories, instrumentation for high efficiency in the control of temperatures, heat and efficiency of fuel utilization, mechanized material, handling facilities; provisions for using tar, oil or gas for fuel; and special facilities for the handling of scrap metal. (D2, ST)

42-D. Oxygen as a Means of Increasing Bessemer Production. II. (Concluded.) W. G. McDonough. *Industrial Heating,* v. 18, Dec. 1951, p. 2211-2212, 2214, 2218.

Experiences of National Tube Co., McKeesport, Pa. Experimental oxygen blows, involving such factors as varying oxygen volume, rate of flow and time of input. Tables and graphs. (D3, ST)

43-D. $CaCN_2$—a Useful Ladle Addition. A. M. White. *Metal Progress,* v. 60, Dec. 1951, p. 79-80.

Probably the largest application is for tinplate where N_2 causes increased temper hardness with less cold reduction. (D9, ST)

44-D. Carbon Lining for Blast Furnaces. *Metal Progress,* v. 60, Dec. 1951, p. 106, 108. (Condensed from the Evolution of the All-Carbon Blast Furnace. J. H. Chesters, E. D. Elliott, and J. Mackenzie.)

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 150-D, 1951. (D1, ST)

45-D. Some Practical Aspects of Recent Developments in Open Hearth Furnace Design and Operation. A. H. Leckie. *West of Scotland Iron and Steel Institute Journal,* v. 57, 1949-50, p. 21-50; disc., p. 51-62.

Results of recent research. Principles of design of flues and regenerators. Factors governing port design. Melting chamber design, with instruments and furnace operation, and brief mention of basic roofs and oxygen. 19 ref. (D2, ST)

46-D. The Relationship Between Carbon Deposition and Reducibility. J. M. McLeod. *West of Scotland Iron and Steel Institute Journal,* v. 57, 1949-50, p. 242-253.

Carbon deposition and reducibility of iron ores and sinters under conditions similar to those in the blast furnace were investigated. Carbon-deposition ranges for some ores and sinters and variation in amount of deposited carbon with varying CO/CO_2 ratios were determined. Carbon deposition is at a maximum with easily reduced ores or sinters. Results are graphed. (D1, Fe)

47-D. Determination of Strength of Graphite Stoppers Used in Bottom Pouring. (In Czech.) O. Kallauner. *Hutnické Listy,* v. 6, Oct. 1951, p. 494-495.

Various methods of compression testing. Proposes a standard test for this type of stoppers. (D9)

48-D. Mineralogical Investigations on Basic Openhearth Slags. (In Polish.) Jerzy Zieba. *Hutnik,* v. 17, Nov.-Dec. 1950, p. 410-415.

Evaluates two methods. Results are tabulated and illustrated for each of the phases present. Photomicrographs. (D2, ST)

49-D. Comparative Tests on the Applicability of Materials for Pouring Ladles. (In Italian.) Giuseppe Ziliani and Giuseppe Grungo. *Metallurgia Italiana,* v. 43, Nov. 1951, p. 476-481; disc., p. 481-482.

Because of the presence of free quartz in standard refractories, resulting in their low chemical resistance to molten steel, use of chamotte refractories is proposed. When steel contains a normal content of Mn, refractories with a low content of Al may be used with good results. (D9, B19, ST)

50-D. Hydrogen as a Reducing Agent. Carle R. Hayward. *Engineering and Mining Journal,* v. 153, Jan. 1952, p. 85-87.

Various methods of reduction of metals by H_2. Emphasis is on Fe, but brief mention is also made of Ni and Sn.

(D general, C general, Fe, Ni, Sn)

51-D. Ten-Ton Ingot Moulds; A Comparison of Design and Conditions of Use. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 608-614; disc., p. 639-644.

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 152-D, 1951. (D9, ST)

52-D. Ingot Heat Conservation; Mould Temperature Measurements. R. T. Fowler and J. Stringer. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 606-608; disc., p. 639-644.

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 151-D, 1951. (D9, S16, ST)

53-D. High Purity Iron; Production on a 25-lb Scale. B. E. Hopkins, G. C. H. Jenkins, and H. E. N. Stone. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 614-616.

Previously abstracted from *Journal of the Iron and Steel Institute,* See item 286-D, 1951. (D8, Fe)

54-D. Ingot and Mould; The Process of Gap Formation. E. T. Linacre. *Iron & Steel,* v. 25, Jan. 1952, p. 3-7, 16.

Results of an attempt to establish the nature of the process of gap-formation, so as to provide a basis for calculations of the heat flow from ingot to mold; metallurgical consequences of the phenomenon. The existing evidence and some calculations in this report suggest that with a 3-ton ingot, gap-formation starts at the bottom about 3 min. after teeming and is later in a highly alloyed steel ingot. It seems probable that the ingot surface quality and the mold life are affected by the way the gap forms, but there has been little attempt to control the process. 39 ref. (D9, ST)

55-D. Basic O. H. Steel; Calculating the Furnace Charge for Consistent Output. J. R. Cuthbert. *Iron & Steel,* v. 25, Jan. 1952, p. 20-24.

A method for calculation which takes into account the varying composition of the ingoing materials and compares actual charge weights and furnace performances with the figures obtained. (D2, ST)

56-D. Blast Furnace Practice. I. Operating Theories. II. Thermal Requirements of Shaft. III. Hearth and Bosh Reactions. Charles E. Agnew. *Steel,* v. 129, Dec. 10, 1951, p. 102, 104, 106, 109; Dec. 24, 1951, p. 66-67, 70, 72; Dec. 31, p. 62, 64-65.

The efficient control of thermal economy. Importance of gas flow through the stack. Why thermal conditions in the bosh exert a major influence on fuel consumption and productivity of the stack. (To be continued) (D1)

57-D. The Operation of Hot-Blast Stoves With Waste-Gas Circulation. (In German.) Arthur Rein and Oskar J. Stebel. *Stahl und Eisen,* v. 71, Nov. 22, 1951, p. 1310-1313; disc., p. 1313-1314.

Design data. Maximum hood temperature was determined. The equipment and its operation. Compares operation with and without waste-gas circulation. (D1, ST)

58-D. Graphite Plugs for Ingot-Mold Bottoms. (In German.) Erich Boeckers. *Stahl und Eisen,* v. 71, Nov. 22, 1951, p. 1314-1316.

Results of American and German investigations. Shows that completely graphitized material is superior. Avoidance of formation of refractory inclusions. (D9)

59-D. Lining of Blast Furnaces With Carbon Bricks. (In German.) Alfred Send. *Stahl und Eisen,* v. 71, Dec. 6, 1951, p. 1361-1365; disc., p. 1365.

Development from the carbon-brick-lined hearth to the all-carbon blast furnace. Results of investigation of the durability of German and British carbon bricks. Application to the stack. Schematic diagrams. (D1, ST)

60-D. (Book) **Surface Defects in Ingots and Their Products.** Iron and Steel Institute, 4 Grosvenor Gardens, London S.W.1, England. 25s.

Covers steel ingots and their products. Small line drawings, give additional information as to the location of the defects in the mass. (D9, ST)

61-D. Melting Low Carbon Stainless Steel. Walter Crafts and H. P. Rassbach. *Journal of Metals,* v. 4, Jan. 1952, p 20-25

Slag and metal relationships for oxidation, reduction, and addition steps in electric-furnace melting very low carbon heats. Conclusions. (D5, SS)

62-D. Discussion of the Axial Compressor for Blast Furnace Blowing. *Iron and Steel Engineer,* v. 29, Jan. 1952, p. 79-84.

Covers paper by W. O. Lowell (Oct. 1951 issue; see item 363-D, 1951).
(D1, Fe)

63-D. Comparative Economics of the Electric Furnace and Open Hearth. H. W. McQuaid. *Iron and Steel Engineer,* v. 29, Jan. 1952, p. 85-93; disc., 93-95.

An investigation of the economic problems involved in the selection of steelmaking furnaces.
(D2, D5, ST)

64-D. Porous Steel. *Business Week,* Jan. 19, 1952, p. 89-90.

Process developed by Ontario Research Foundation which turns out parts with any desired density from 92 to 453 lb. per cu. ft. Instead of pouring a molten metal into a mold, impurities like silica are first removed from the ore, leaving only pure iron oxide particles which are ground to a fine size. Then the ore is poured into porous molds, and ore and molds are placed in a ceramic crock, which is then filled with coke and limestone. The crock is put in a furnace and held at 2000° F. for several hours. Result is a part with a cellular structure. (D8, ST)

65-D. Accurate Methods for Computing Electric Furnace Heats. R. B. Shaw. *Steel,* v. 130, Jan. 21, 1952, p. 72, 74-75.

Ways and means of assisting the melter in making calculations in electric-furnace making of high-alloy or stainless steels. An example is worked out in complete detail. (D5, SS, AY)

66-D. The Development of the Small Bessemer Steel Plant From Its Beginning to the Present Day. (In German). H. Wolff. *Giesserei,* v. 38, Nov. 1, 1951, p. 565-572.

History of the small bessemer converter and other small converter types, such as Clapp-Griffith, Walrand-Delattre, Robert, Tropenas, and Zenzes. Efforts at basic steel production in small converters and the introduction of multiple processes. (D3, ST)

67-D. Should the Steel Industry Move Closer to Liquid Charging? John O. Griggs. *Blast Furnace and Steel Plant,* v. 40, Jan. 1952, p. 51-57.

Liquid charging system and its advantages. Advantages of the dry-bottom tilting furnace over the stationary furnace. Recommends top charging of openhearth furnaces. Schematic diagram shows design for top charging. Tables and graphs show world reserves of iron ore and coal, and coal-carbonization statistics. (D2, B10, ST)

68-D. High Top Pressure Operation or Burden Preparation. A Survey of Differences in Blast Furnace Practice in the United States and Britain. D. D. Howat. *Blast Furnace and Steel Plant,* v. 40, Jan. 1952, p. 71-76.

Includes tables and illustrations. (D1, ST)

69-D. Hot Topping Practice. W. T. Sergy. *Blast Furnace and Steel Plant,* v. 40, Jan. 1952, p. 89-90.

Practice at Jones & Laughlin Steel Corp. Use of the re-usable or permanent-type hot top makes it possible to reduce the volume of the sinkhead by approximately 3% on slab ingots. Diagrams. (D9, ST)

70-D. Transverse Ingot Cracks. Norman F. Dufty. *Blast Furnace and Steel Plant,* v. 40, Jan. 1952, p. 91-94, 130-131.

Causes are believed to be primarily in the steelmaking process, rather than in subsequent working operations. Effects of mold design, pouring practice, and steel composition and temperature. 11 ref. (D9, ST)

71-D. Oxygen as a Means of Increasing Bessemer Production. III. W. G. McDonough. *Industrial Heating,* v. 19, Jan. 1952, p. 71-72, 74, 76, 78, 80.

The general effect of the oxygenated blast on converter slags and bessemer steel quality. Blowing time, flame appearance, and converter bottoms and linings. Conclusions as to the use of O_2 in acid bessemer converters. (D3, ST)

72-D. Direct Reduction Yields Variable Density Steels. P. E. Cavanagh. *Iron Age,* v. 169, Jan. 24, 1952, p. 63-68.

A process for producing useful articles of carbon or alloy steel directly from iron ore. The main characteristics are low cost and a wide choice of weight and strength. Fine, prepared ore or mill scale is reduced with coke and limestone in a continuous kiln, yielding plain carbon or alloyed steel. Bars, slabs, pipe, and other shapes have been produced with densities of 1.0-7.2 g. per cc. Graphs and tables show physical and mechanical properties. (D8, P general, Q general, Fe, CN, AY)

73-D. A Survey of Zebra Roof Practice. C. E. Grigsby. *Journal of Metals,* v. 4, Feb. 1952, p. 132-139.

The zebra roof for openhearth furnaces comprises rings of either regular or super-duty silica brick, alternated with rings of basic brick in areas of greatest wear—along back or front skews, or both. (D2)

74-D. Principles of Zone-Melting. W. G. Pfann. *Journal of Metals,* v. 4, Feb. 1952, p. 151.

Solidification method known as zone-melting. A basic feature is the traversal of a relatively long charge of solid alloy by a short molten zone, and a basic consequence of which is a high degree of control of the distribution of solute in the ingot. (D9, C5, N12)

75-D. Behaviorism of Elements in Iron and Steel Making. Herbert W. Graham. *Metal Progress,* v. 61, Jan. 1952, p. 87-96.

The present iron ore situation. Classifies the chemical elements in the raw materials as to their behavior in conventional iron and steelmaking processes by assembling data on oxide stability combined with a summation of empirical experience. Graphs and tables show relation of behavior to location in the periodic system.
(D general, B general, Fe, ST)

76-D. Openhearth Charge Ores. *Metal Progress,* v. 61, Jan. 1952, p. 152, 154, 156. (Condensed from paper by John J. Golden and Henry E. Warren.)

Previously abstracted from *American Iron and Steel Institute,* Preprint, 1951. See item 202-D, 1951.
(D2, B22, Fe, ST)

77-D. Desulphurization Worth Watching. William W. Austin, Jr. *Steel,* v. 130, Jan. 28, 1952, p. 76, 78, 80-81.

Investigation shows that desulfurization efficiency in blast furnaces is low. Various ways for improving the process. (D1, Fe)

78-D. Coke Consumption Rate Determines Furnace Charges. *Steel,* v. 130, Feb. 4, 1952, p. 91-93. (Based on paper by R. V. Flint and J. J. Kulesz.)

Coke consumption in blast furnaces. (D1, Fe)

79-D. Fluid Flow in Relation to the Manufacture of Steel. M. P. Newby. "Some Aspects of Fluid Flow," 1951. (Edward Arnold & Co., London), p. 194-215.

Problems in fluid flow which arise in the various processes of the steel plant. Recent studies, especially that carried out by the British Iron and Steel Research Assn. Includes studies on the blast furnace, steelmaking processes, oil metering, water cooling, melting-shop ventilation, casting and pouring, and soaking pits and reheating furnaces. 21 ref. (D general, ST)

80-D. Use of the Triplex Process in a Steel Foundry. (In French.) *Fonderie,* Dec. 1951, p. 2742-2746.

Process consists of using a cupola, a small acid converter, and a basic arc furnace for producing steel. Data are tabulated. (D7, ST)

81-D. The Burner Ports of Openhearth Furnaces Fired With Coke-Oven Gas. (In German.) Friedrich Wesemann and Wilhelm Schmitt. *Stahl und Eisen,* v. 71, Dec. 1951, p. 1413-1419; disc., p. 1419-1420.

Design considerations. Results of investigation of several furnaces with different gas-port dimensions and shape. Compares these with results of model experiments.
(D2, ST)

82-D. Refractory Linings for Openhearth Furnaces. Comparative Factors Between Acid and Basic Linings. (In Italian.) A. Scortecci and F. Savioli. *Metallurgia Italiana,* v. 43, Dec. 1951, p. 521-525.

The three systems presently available: silica bricks with or without basic bricks for certain parts; quartzite tamped lining for everything except the arches; and all-basic linings. 23 ref. (D2, ST)

83-D. Production of Sponge Iron in a Tunnel-Type Furnace. (In Spanish.) Patrick E. Cavanagh. *Instituto del Hierro y del Acero,* v. 4, Apr.-June 1951, p. 93-97.

Investigations conducted at the Ontario Research Foundation in Canada. Data are tabulated and charted. (D8, Fe)

84-D. Rammed-Carbon Blast Furnace Hearths. Part II. (In Spanish.) Francisco Millan. *Instituto del Hierro y del Acero,* v. 3, Oct.-Dec. 1950, p. 282-287.

Economics of construction, and manufacture of the carbon bricks. Tables and diagrams. (D1, Fe)

85-D. Use of Oxygen and Carbon Dioxide Instead of Air in the Final Stage of the Basic Bessemer Process. (In Swedish.) Bo Kalling, Folke Johansson, and Lennart Lindskog. *Jernkontorets Annaler,* v. 135, No. 10, 1951, p. 557-572.

Results of a number of experimental blows in a 14-ton basic bessemer converter, in which the charges were dephosphorized with O_2/CO_2 instead of air. Nitrogen content was reduced to about 0.006% in the finished steel, as against about 0.012% by normal air blows. A further reduction to 0.003-0.004% was possible by using oxygenated air for the preliminary blowing. Equal parts of O_2 and CO_2 produced approximately the same temperature conditions as air-blowing but the blowing time was slightly shortened. There was no apparent increased injury to the converter bottom. Another advantage of final blowing with O_2/CO_2 is that pouring temperature can be adjusted to that most suitable for the mode of pouring and the quality of the steel. 20 ref. (D3, ST)

86-D. How Much Can Oxygen Do? *Business Week,* Feb. 2, 1952, p. 46, 48.

The role of oxygen in steelmaking. (D general, ST)

87-D. Direct Reduction Yields Variable Density Steels. Part II. P. E. Cavanagh. *Iron Age,* v. 169, Jan. 31, 1952, p. 108-111, 114.

How a pipe was made by rushing a mold through the kiln—and then dumping out unreduced ore in center. Hot-swaged bar (of mill scale) has same density and properties as steel of same analysis. One piece can have different chemistries and properties. (D8, CI)

88-D. Oxy-Natural Gas Hot-Top Heating Increases Ingot Yield. A. J. Texter and E. F. Kurzinski. *Iron Age,* v. 169, Feb. 14, 1952, p. 126-128.

The latest, and possibly the best answer, to the old problem of hot-top size is heating with oxy-natural gas. High-alloy and stainless steel ingots are now being poured using this standardized method with no bad effects on steel quality. The practice is simple and quick and no water cooling of burner is necessary. (D9, SS, AY)

89-D. Some Experiences in the Use of Chrome-Magnesite Refractories. G. Reginald Bashforth. *Metallurgia,* v. 45, Jan. 1952, p. 12-16.

The structure and constitution of the materials as related to performance in openhearth steelmaking. Micrographs. (D2)

90-D. Blast Furnace Practice. IV. Influence of Coke-Ash on Thermal Effects. V. Comparison of Operating Data. Charles E. Agnew. *Steel,* v. 130, Feb. 4, 1952, p. 98, 101-102, 104, 107, 110; Feb. 11, 1952, p. 97, 100, 102, 105, 108.

Thermal economy in smelting operations and relationship between constituents of tapping slag and % ash in coke. The method used for classifying slag by tetrahedrons. The four principal constituents of daily average slag analysis are first converted to the 100% composition, from which the tetrahedron for the day is determined by applying the analysis to the McCaffery diagram. Advantages of this method. (To be continued.) (D1, Fe)

91-D. Silica Versus Basic Bricks. T. R. Lynam. *British Steelmaker,* v. 18, Feb. 1952, p. 79, 81.

Relative merits of silica and basic products in the basic openhearth furnace. (D2)

92-D. Low-Carbon Ferro-Chrome-Silicon Cuts Stainless Ingot Costs. N. B. McFarlane. *Iron Age,* v. 169, Feb. 21, 1952, p. 108-110.

The alloy is produced in electric furnaces by carbon reduction from selected ores. The production process. Advantages, particularly lower cost. (D5, SS, Fe-n)

93-D. An Experimental Furnace for the Investigation of Openhearth Furnace Combustion Problems. Part V. Experiments With the Venturi Port and Modifications Thereof. Part VI. Summary of Results and Their Application in Practice. J. F. Allen, J. R. Hall, and A. H. Leckie. *Journal of the Iron and Steel Institute,* v. 170, Jan. 1952, p. 37-48.

The effect on heat transfer of the position of the gas-port nose and the steepness of the ramp roof in ports of the Venturi type. Improved results were obtained by moving the gas port back, and by steepening the roof ramp. Extent to which the experimental results obtained have been applied in practice. Arrangements for future investigations of openhearth furnace combustion problems. (D2, Fe)

94-D. Practical Considerations of Openhearth Bottom Construction. Philip A. Gaebe. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 13-26.

Previously abstracted from *Blast Furnace and Steel Plant.* See item 2-D, 1952. (D2, ST)

95-D. Effects of Low-Manganese Pig Iron on Openhearth Operations. John A. Hornak. *Proceedings, National Open-Hearth Committee, Iron and Steel Division, American Institute of*

Mining and Metallurgical Engineers, v. 34, 1951 p. 27-42.

A statistical analysis. In general, the quality of the final product was not diminished to any appreciable extent by low-Mn pig iron. Data are graphed. (D2, Fe)

96-D. Methods of Increasing Inland Steel's Openhearth Production. George C. Lawton. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 43-50; disc., p. 50-52.

Increasing steel production through the use of existing units. Factors such as quality of scrap, furnace operation, decreasing charging time and various others. (D2, A4, ST)

97-D. Increase in Ingot Production by the Use of Oxygen. E. H. Leathers and C. W. Drabers. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 53-56; disc., p. 56-58.

The amount and quality of raw materials and the necessary auxiliary equipment to properly change increasing tonnage and to handle it after it has been obtained as primary factors in use of O_2. (D2, ST)

98-D. Increasing Armco Steel Corporation's Openhearth Production. W. W. Bergmann. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 58-59; disc., p. 59-60.

Practices at the No. 1 openhearth shop at the Middleton Division of Armco Steel Corp. (D2, ST)

99-D. Increasing Production at the Kaiser Openhearth Plant. W. F. Bowers. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 61-63; disc., p. 63-64.

Plant practices. (D2, ST)

100-D. Methods of Increasing Openhearth Production. E. J. Dattisman. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 64-65; disc. p. 65-69.

Analyzes some of the fundamentals needed to produce the best tap-to-tap time. (D2, ST)

101-D. Availability of Openhearth Furnaces, Sparrows Point Plant. R. M. Baker. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 70-76; disc., p. 76-77.

Bethlehem Steel Co. plant at Sparrows Point, Md. General repair and maintenance jobs necessary. (D2, ST)

102-D. Furnace Availability at Ford Motor Company. M. J. Smith, *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 78-79; disc., p. 79.

Practices of openhearth maintenance and scheduling. (D2, ST)

103-D. Use of Basic Brick to Increase Availability at Weirton Steel Comany. S. J. Dougherty. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 80-81; disc., p. 81

Experiences of above company. (D2, ST)

104-D. Jet Tapper Practice at the Openhearth. H. J. Walker and A. Robert Almeida. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 81-86.

Operating principles and development. Some recent results. (D9, ST)

105-D Safety Precautions in Jet Tapping. R. H. Ferguson. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 87-91; disc., p. 91-92.

Equipment and procedures for tapping openhearth furnaces. Explosives are used, resulting in substantial advantages in safety. (D9, ST)

106-D. Furnace Design for Increased Production. D. R. Loughrey. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 93-98.

Includes roof construction, front-wall, back-wall, and bottom construction, checkers, flues and stacks, and uptakes. (D2)

107-D. Furnace Design for Increased Production. J. M. Brashear. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 98-101; disc., p. 101.

Design of openhearth furnaces at the Inland Steel plant, East Chicago. (D2, ST)

108-D. Furnace Design and Shop Arrangement for Increased Production. J. L. Hyland. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute*

of Mining and Metallurgical Engineers, v. 34, 1951, p. 102-107.

Practice at the Buffalo plant of Republic Steel Corp. Openhearth furnace diagrams. (D2, ST)

109-D. Some Metallurgical Advantages of the Acid Openhearth Process. H. P. Rassbach. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 109-115; disc., p. 115-119.

Such problems as why large nonmetallic inclusions are sometimes found in the interior of large steel sections, the outside of which are flawless, and why a long holding period in a ladle is ineffective in producing clean steel. 10 ref. (D2, ST)

110-D. Combination Basic and Silica Brick in Openhearth Roof Construction. C. G. Poth. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 142-150; disc., p. 150-156.

Results of combinations of alternate courses of silica and basic brick as obtained at the Massillon plant of Republic Steel Corp. (D2)

111-D. Openhearth Bottoms. H. M. Kramer and G. H. Anthony. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 157-161.

An appraisal of magnesite, slag, and Cr-bearing brick. (D2)

112-D. Openhearth Furnace Bottoms, Fairfield Steel Works. C. C. Benton. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 162-165; disc., p. 165-172.

The materials used, scrap contamination and resurfacing of bottoms. (D2, ST)

113-D. Importance of Ladle Lining. C. E. Sumpter. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 172-174; disc., p. 174-178. (TSI Am350)

Properties of ladle brick and factors prolonging ladle life. (D9)

114-D. Linings for Hot-Metal Mixers. K. D. Bartels. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 178-183.

Included in the program were blast-furnace brick fired to cone 18, high-fired Missouri superduty fireclay brick, both dry-pressed and stiff mud, Missouri superduty fireclay brick fired to cone 23, chrome-magnesite brick burned and unburned, sillimanite brick, and 70% alumina brick. (D1, ST)

115-D. Factors Affecting Spread in Manganese Between First and Last Ingots of Rimming-Steel Heats. Michael Tenenbaum and C. C. Brown. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 208-213.

Causes of Mn losses between pouring the first and last ingots. Limited data regarding slag-metal conditions. Data are graphed and tabulated. (D9, ST)

116-D. Factors Affecting Spread in Manganese Between First and Last Ingots. Ralph D. Hindson. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 214-219; disc., p. 219-221.

Investigation showed that losses of Mn were due to type of steel, Mn content, Si content, time in ladle, basicity of furnace slag at tap, and type of ladle lining used. Some methods of decreasing these losses. Data are graphed. (D9, ST)

117-D. Factor Affecting the Surface Quality of Killed Steel Containing 0.15 to 0.20 and 0.40 to 0.55 Per Cent Carbon. L. W. Fleming. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 222-225.

Experience in the manufacture of various grades of steel with special emphasis on furnace working practice and deoxidation, effect of S and Mn on quality of product, pouring practice, including mold conditioning and mold-coating practice, and transit time. Data are tabulated. (D2, D9, ST)

118-D. Factors Affecting Surface Quality of 0.40 to 0.55 Per Cent Carbon Killed Steel. A. E. Reinhard. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 225-226.

Silicon content, sulfur content, and temperature are included in the survey. (D2, ST)

119-D. Factors Affecting Surface Quality of 0.40 to 0.55 Per Cent Carbon Killed Steel. D. J. Taylor. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 227-230.

Includes such factors as pouring practice, mold preparation, control of

furnace temperature, and extensive observations of soaking-pit heating practice. (D9, ST)

120-D. Factors Affecting Surface Quality of 0.40 to 0.55 Per Cent Carbon Killed Steel. A. K. Moore. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 230-234.

On the basis of experiences of Steel Co. of Canada, reduction of S, reduction of track time, increasing the rate of pour, and producing better slag-to-metal equilibrium at the block, are recommended for reduction of rejections in the above range of forging-quality steels. Data are graphed. (D9, ST)

121-D. Production of Mechanically Capped Steel Over 0.15 Per Cent Carbon. E. N. Hibbert. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 234-237.

Major features of the practice in use at Ohio Works of U. S. Steel Co. include: low-melt sulfur in order to obtain low sulfur without "working" sulfur, furnace practice leading to a well-oxidized bath at tap, including tapping at approximately 0.10% C, recarburizing with coal in the ladle, and use of NaF in the molds. (D9, ST)

122-D. Control of Low-Carbon and Killed Steel for Deep Drawing Quality. A. E. Reinhard. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 247-249.

Principal items to guard against in the scrap are alloys and sulfur. (D2, B22, ST)

123-D. Manufacture of Low-Carbon Rimmed and Killed Steels for Deep Drawing. Karl L. Fetters. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 250-252.

Methods for deoxidizing the steel. (D2, ST)

124-D. High-Iron Ore Charges for Cold-Metal Heats. H. M. Parker. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 259; disc., p. 259-260.

The practice of charging ore in cold-metal heats to obtain a reasonable melt carbon with above-normal percentages of iron in the charge. (D2, B22, ST)

125-D. Refractories and Their Performance in Cold-Metal Shops. Paul B. Akin. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 261-262; disc., p. 262.

Experiences of the Laclede Steel Co., Alton, Ill. Basic brick was used to increase furnace life as follows: basic-brick end seals on silica furnaces, basic front walls, and all-basic ends. (D2)

126-D. Use of Superduty Silica Brick in Openhearth Roofs. C. M. Kay. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 266-267; disc., p. 268.

Advantages found by American Steel and Wire Co., Worcester, Mass. (D2)

127-D. Pit Practice. James L. Jennings and Gordon McMillin. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 269-271; disc., p. 271-272.

Optimum practice for the maintenance and use of runners, ladles, stoppers and nozzles at General Steel Castings Corp., Granite City, Ill. (D9, ST)

128-D. Flow Patterns in Openhearth Furnaces. J. H. Chesters. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 282-306; disc., p. 306-310.

Previously abstracted from *Chemistry & Industry.* See item 225-D, 1951. (D2, ST)

129-D. Use of High-Pressure Gas in the Openhearth. Milton P. Burns. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 311-316.

The functions of atomizing fluids. Gases available as atomizing agents. Results of experiments conducted by the Tennessee Coal, Iron and Railroad Co. showed that, with a burner of proper design, natural gas could be substituted for steam as an atomizing agent. (D2)

130-D. Analyses of Waste Gas From Openhearth Furnaces. T. W. Bailey. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 316-318.

When, where, and how samples should be taken. (D2, S11)

131-D. Waste-Gas Analysis. J. M. Brashear. *Proceedings, National Open Hearth Committee, Iron and Steel Di-*

110-E. Spheroidal Graphite in Cast Iron. *Metal Progress,* v. 60, Dec. 1951, p. 156-158. (Condensed from "Crystallization of Cast Iron With Nodular Graphite," K. P. Bunin and G. I. Ivantsov.)

Previously abstracted from *Doklady Akademii Nauk SSSR.* See item 442-E, 1950. (E25, CI)

111-E. Stainless Steel Foundry Conserves Critical Alloys. Gilbert C. Close. *Steel,* v. 129, Dec. 24, 1951, p. 58-59.

How 44,000 lb. of castings per month are being produced by an integrated foundry operating on scrap generated in other parts of the plant (Solar Aircraft Co., San Diego). Several "impossible" production jobs of casting Type 321 stainless are now routine. (E general, SS)

112-E. Modern Metallurgy of Cast Iron. H. Morrogh. *West of Scotland Iron and Steel Institute Journal,* v. 57, 1949-50, p. 62-80, disc., p. 81-84.

Method of formation from the liquid state of white and gray structures, eutectic structures, fine graphite, flake graphite, and nodular graphite. (E25, CI)

113-E. Review of the More Common Foundry Defects in Aluminum Alloy Castings and Their Respective Causes. (In Italian.) Mario Barbero. *Metallurgia Italiana,* v. 43, Nov. 1951, p. 482-484.

(E25, Al)

114-E. Plastics in the Metalworking Industry. *Bakelite Review,* v. 23, Jan. 1952, p. 10-12.

Applications to foundry molds, parting boards and patterns, investment casting, and forming die and drill jigs. (E17, E19, E15, G general)

115-E. How to Use the Cupola. (Concluded). Bernard P. Mulcahy. *Foundry,* v. 79, Dec. 1951, p. 250, 252; v. 80, Jan. 1952, p. 152, 155.

Influence of C, Si, and other elements on cupola metal. Concluding installment: tests for mechanical properties of cupola iron, and use of deoxidants, graphitizers, and alloy additions. (E10, Q general, CI)

116-E. Casting 100,000 Valve Seat Inserts Daily. Robert H. Herrmann. *Foundry,* v. 80, Jan. 1952, p. 76-81, 242-245.

The efficient design for mass production of specialized, high-quality, corrosion, heat and wear resistant castings in white and gray alloyed irons at Engineering Castings, Marshall, Mich. (E11, CI)

117-E. Foundry Statistics. *Foundry,* v. 80, Jan. 1952, p. 161.

Tabulated information on shipments of various types of castings and materials, production workers, coke and pig iron production and consumption, and iron and steel scrap consumption. (E general, A4)

118-E. How to Use Copper Alloys in Die Castings. L. F. Spencer. *Iron Age,* v. 169, Jan. 10, 1952, p. 90-91.

Problems involved in the high casting temperature of Cu alloys. Die design considerations. Data on mechanical properties are tabulated. (E13, Q general, Cu)

119-E. Foundry Dressing Operations; Control of Dust. R. F. Ottignon. *Iron and Steel,* v. 24, Aug. 1951, p. 389-392.

Previously abstracted from *Institute of British Foundrumen.* Paper 1008; see item 427-E, 1951. (E24)

120-E. Inoculation of Cast Iron; Use of Calcium Silicide. W. S. Williams. *Iron & Steel,* v. 25, Jan. 1952, p. 9-10, 32.

Reviews a previous article on the quasi-bessemerizing process. Advantages of this process. Methods adopted in its use. (E10, E25, CI)

121-E. Investment Casting; Money Saving Mass Producer. R. R. Miller. *Steel,* v. 130, Jan. 14, 1952, p. 58-59.

Techniques used by Precision Metalsmiths Inc. of Cleveland. (E15, Fe)

122-E. Trimming Production Costs Through Impregnation Methods. M. Jordan Nathason. *Western Machinery and Steel World,* v. 42, Dec. 1951, p. 98-100.

Reasons for porosity in metal castings, sealants in use, preventive vs. salvage impregnation, methods of impregnation, and a bonding technique employing impregnation methods. (E25)

123-E. Controlled Solidification to Cast Forming Dies Halves Grinding and Polishing Time. *Western Metals,* v. 9, Dec. 1951, p. 35-36.

Method employs bronze flexible tubing which runs through the special high-conductivity facing sand at a distance of approximately ½-in. from the mold-metal interface. Uniform cooling of the working face of the dies is possible. Material is Kirksite. (E25, Zn)

124-E. The Effect of Cupola Burn-Out on the Melting of Cast Iron With Special Reference to the Water-Cooled Cupola Furnace. (In Dutch.) G. L. Jones and Van Bergen. *Metalen,* v. 6, Nov. 15, 1951, p. 397-404.

Defines the average burn-out cross section (arithmetical average of the burn-out area above each tuyere). Three series of tests show that, by water cooling of the melting zone, it is possible to obtain minimum burn-out of the lining and produce longer melts with all the economic

and metallurgical advantages of a constant inside cupola diameter. (E10, CI)

125-E. Defects in Castings; Defective Shape. (In Swedish.) J. Drachmann. *Gjuteriet,* v. 41, p. 172-175.

Second part of the list of defects in castings and their causes compiled by the Swedish Committee on Defects in Castings. (E25)

126-E. (Book). **Chill-Cast Tin-Bronzes.** D. Hanson and W. T. Pell-Walpole. 368 pages. Edward Arnold & Co., 41 Maddox St., London, W.1, England. 75s.

The metallurgy of tin bronzes, with special emphasis on the theories, researches and practices of chill casting. Recommendations on compositions, melting, pouring rate, and mold temperatures. The main treatment in the book is liberally applied to the production of sound homogeneous material in chill-cast form, notably for billets, e.g., cored and solid bushing material and ingots for subsequent working. (E general, E23, Cu)

127-E. (Book) **Directory of Steel Foundries in the United States, Canada, and Mexico.** 208 pages. 1951. Steel Founders' Society of America, 920 Midland Bldg., Cleveland 15, Ohio.

Personnel and production facilities. Producers of heat and corrosion resistant steel castings, high-Mn castings, investment-mold castings, and toolsteel castings are also included. (E general, A10, CI)

128-E. Metallurgy of Shell Molding. B. M. Ames, S. B. Donner, and N. A. Kahn. *American Foundryman,* v. 21, Jan. 1952, p. 24-29.

Plastic-bonded shell molds have an insulating quality overlooked by many foundrymen. This factor, plus soundness, mechanical properties of shell cast metals, and other metallurgical factors studied at the New York Naval Shipyard. Effects of various factors on macrostructures and mechanical properties. Work was done on Al alloys, bronzes, gray cast iron, and cast steel. (E16, M28, Q general, Al, Cu, CI)

129-E. Side Risers Cut Cleaning Room Costs on Alloy Iron Castings. Roy Chamberlin. *American Foundryman,* v. 21, Jan. 1952, p. 33-36.

How side risering of special alloy iron cut cleaning room costs and produced sound castings when top risering failed. Numerous schematic diagrams. (E22, CI)

130-E. Basic Cupola Operation. John P. Holt. *American Foundryman,* v. 21, Jan. 1952, p. 39-43.

How to overcome difficulties involved in converting from acid to basic cupola operations. Advantages, applications, installation, operation, and maintenance. (E10, CI)

131-E. Modern Foundry Methods: Equipment and Layout for Small Foundry. *American Foundryman,* v. 21, Jan. 1952, p. 44-47.

Plant at Engineering Castings, Inc., Marshall, Mich.—a small alloy-iron foundry. (E general, CI)

132-E. Gray Iron Fluidity Variables; Effect of Composition and Pouring Temperature. Lew F. Porter and Philip C. Rosenthal. *American Foundryman,* v. 21, Jan. 1952, p. 53-59.

A spiral test mold, modified to give a mean deviation of less than 2.0% in duplicate tests, was used to determine the effects of temperature and metal composition on the fluidity of cast irons. Some of the tests were conducted to provide data on the effects of individual elements, and also on the interrelated effects of the components. From the test data, a tentative formula was derived which makes possible the prediction of relative effects of analysis variations and pouring temperatures on fluidity of the iron. (E25, CI)

133-E. This Mold Wasn Works With All Common Casting Alloys. R. E. Morey and C. G. Ackerlind. *American Foundryman,* v. 21, Jan. 1952, p. 67-70.

Practical trials show that a bentonite-dextrin-silica flour mold wash developed by the Naval Research Laboratory gives excellent performance with all common ferrous and nonferrous casting alloys, including steel, brass, bronze, Al, Mg, and cast iron. (E19)

134-E. Vacuum Impregnation of Castings. L. W. Hull. *Journal of Metals,* v. 4, Jan. 1952, p. 30-32.

Vacuum impregnation of castings eliminates rejects under buyer's tests and insures against failure in service. Impregnating materials and methods. The method of vacuum impregnation followed by pressure. (E25)

135-E. Centrifugal Casting of Ferrous Metals. C. D. Donoho. *SAE Journal,* v. 60, Jan. 1952, p. 60-67.

A summary of experiences as reported by the Executive Committee of the SAE Iron and Steel Technical Committee. (E14, CI)

136-E. Uniform Grain Structure Favors Permanent Mold Over Sand for Gray Iron Castings. *Precision Metal Molding,* v. 10, Jan. 1952, p. 26-27, 64.

How De Walt, Inc., was able to get more uniform grain structure in gray-iron permanent-mold castings. High efficiency of die-cast Al rotors was also obtained. (E25, E12, CI, Al)

137-E. Brush Holders: Typical Electrical Components by Investment Casting. *Precision Metal Molding,* v. 10, Jan. 1952, p. 28-29.

Production by the Chicago Pneumatic Tool Co., Utica, N. Y. The article can be used in the as-cast condition. Parts made from bronze and Be-Cu are illustrated. (E15, T1, Cu)

138-E. Plaster Mold Casting; Greater Freedom of Coring for the Designer. *Precision Metal Molding,* v. 10, Jan. 1952, p. 31.

Advantages and limitations to be derived from the process as applied to nonferrous metals. (E16, EG-a)

139-E. "Wrappings" For This Power Package Are Die Cast Wherever Cores Can Be Pulled; Permanent Mold Cast With Sand Cores Where There Are Undercuts. Wm. Beecher. *Precision Metal Molding,* v. 10, Jan. 1952, p. 32-34, 56-57.

Die-cast and permanent-mold-cast components of a light-weight motorcycle. Major parts are fabricated from Al and Al alloys. (E12, E13, Al)

140-E. Investment Casting From Frozen Mercury Patterns as a Means of Reproducing Pieces That Are Too Intricate for Other Techniques. *Precision Metal Molding,* v. 10, Jan. 1952, p. 65-71.

The Mercast process which utilizes frozen mercury as a disposable pattern instead of wax or plastic. (E15)

141-E. Die Casting Die Design. Part VI. H. K. Barton and James L. Erickson. *Magazine of Tooling and Production,* v. 17, Jan. 1952, p. 80, 82, 86, 90, 98, 102, 119.

Design of vents. Advantages and limitations of each. Schematic diagrams. (E13)

142-E. Pressure-Tight Gunmetal Castings; Application of Research Results to Production Technique. L. Buckley and E. C. Mantle. *Foundry Trade Journal,* v. 91, Dec. 27, 1951, p. 727-729.

Some large-scale foundry trials have been carried out to exploit the results of research of the British Non-Ferrous Metals Research Association on the control of porosity in gunmetal castings. Test bars were used to follow changes in the gas content of the metal. Use of test bars in this way is an important departure from the usual practice of casting test-bars mainly for inspection purposes. (E25, Cu)

143-E. Synthetic Resins in the Foundry. *Foundry Trade Journal,* v. 91, Dec. 27, 1951, p. 737-739.

Further discussion of T.S.30 subcommittee report published in July 5 issue. See item 401-E, 1951. (E18)

144-E. Load-Deformation Curves on Dried Sand Specimens and Their Relation to Expansion Defects. R. G. Godding. *British Cast Iron Research Association Journal of Research and Development,* v. 4, Dec. 1951, p. 202-208.

Investigation was made to establish a relationship between the shape of stress-strain curves obtained for certain specimens of dried molding sand and the tendency of these sands to produce expansion scabs or buckles on the casting. Scabs are due to expansion of the sand on heating. An apparatus capable of measuring the deformation of sand at all loads up to breaking load was developed. (E18)

145-E. Die Castings and Investment Castings. E. N. Field. *Machinery* (London), v. 79, Dec. 27, 1951, p. 1130-1136.

Investigation of relative merits of these two methods for production of a particular component—a small bevel gear. Advantages and disadvantages of the two processes. Alloys suitable for each. Schematic diagrams. (E13, E15)

146-E. Formation of Nodular Graphite in Cast Iron. (In German). A. Wittmoser. *Giesserei,* v. 38, Nov. 1, 1951, p. 572-577.

Extensive research concerning the Mg treatment. Graphs, photomicrographs, and schematic diagrams. (E25, M27, CI)

147-E. Contribution to the Laws of Cupola Melting. (In German). W. v. Preen. *Giesserei,* v. 38, Nov. 15, 1951, p. 598-600.

Proposes general formulas for the cupola process which may also be applicable to the general blast-furnace process. Dependence of the formula upon varying plant conditions. (E10, D1, ST)

148-E. Casting Drop-Hammer Dies. *Aircraft Production,* v. 14, Feb. 1952, p. 59-64.

Methods recently developed by several companies in the U. S. for the proper use of new medium- and high-expansion plasters for close tolerance patterns, and also for controlling solidification in the mold. Materials are Zn alloys, Al, and bronze. Diagrams, tabular data, and illustrations. (E17, F22, Zn, Al, Cu)

149-E. Aircraft Magnesium Castings Must Meet Exacting Requirements. Herbert Chase. *Automotive Industries,* v. 106, Feb. 1, 1952, p. 40-43, 108.

Practices used by Howard Magnesium Foundry of Chicago on a Mg alloy known as ZRE-1 which contains small percentages of Zn, Zr, and rare earths. Some of the mechanical properties of this alloy. (E general, Q general, Mg)

150-E. New Foundry Techniques. Part I. *Canadian Metals,* v. 15, Jan. 1952, p. 28-30.

Advanced sand-reclamation systems, cleaning-room practices, new equipment and kindred foundry

methods, and general consideration of problems posed by the pressures of the defense mobilization program. (E general)

151-E. A Reliable Leaded Bronze. Harold J. Roast. *Foundry,* v. 80, Feb. 1952, p. 117, 200-202.

Long and successful experience with the alloy ASTM B30-49 (3D) + 3% Zn recommends it for bearings and castings required to resist corrosion and internal pressure. Melting practice. (E10, T7, Cu)

152-E. Develops Pressurized Cupola. Ernest F. Fisher. *Foundry,* v. 80, Feb. 1952, p. 152-154.

Operation and advantages. Diagrams. (E10, CI)

153-E. Casting in Open Molds. Part III. Pat Dwyer. *Foundry,* v. 80, Feb. 1952, p. 163, 166.

Factors to be considered. (E19)

154-E. Impregnating Castings for Pressure Tightness. *Foundry,* v. 80, Feb. 1952, p. 172.

An improved sealant named P.E. No. 1 is a thermosetting copolymer, containing 100% solids, said to be capable of withstanding extreme pressures and temperatures and of avoiding reaction with industrial liquids and gases. Its application to ferrous and nonferrous castings is said to be quick, economical, and permanent. (E25)

155-E. Casting Nickel Plating Anodes. Herbert Chase. *Foundry,* v. 80, Feb. 1952, p. 204-205.

Foundry at Chevrolet Flint Mfg. Div. of General Motors Corp. contains two rocking-type electric indirect-arc furnaces, a set of cast iron molds in a pit, and auxiliary equipment, including tumbling barrels to remove fins. (E12, Ni)

156-E. Quantity Production of Spheroidal-Graphite Cast Iron. N. Croft. *Foundry Trade Journal,* v. 92, Jan. 3, 1952, p. 5-11.

Development, technique in foundry organization, and production control of the Mg process. (E25, CI)

157-E. Crossley Brothers: Modern Foundry Developments. *Foundry Trade Journal,* v. 92, Jan. 10, 1952, p. 31-36.

Layout and production practices of above British ferrous and nonferrous foundry. (E general)

158-E. Designing Components for Die-Casting. W. M. Halliday. *Foundry Trade Journal,* v. 92, Jan. 10, 1952, p. 37-43.

Sectional thickness of component; uniformity; parting lines; coring methods; threaded and plain holes; taper or draft; dimensional tolerances; and flash formation and removal. Manner in which design may be interpreted and adjusted to give the most suitable form for die casting, coupled with minimum cost of dies and parts. Casting alloys include Sn, Pb, Zn, Al, Mg, Cu. (E13, Sn, Pb, Zn, Al, Mg, Cu)

159-E. Basic-Lined Water-Cooled Cupola at Lynchburg Foundry. W. W. Levi. *Foundry Trade Journal,* v. 92, Jan. 10, 1952, p. 45-48.

The iron suited for spun pipe can be produced in the basic cupola with little or no pig iron, and with 50-70% steel scrap in the charge. (E10, CI)

160-E. Castings for A Small Diesel Engine. H. J. M. Conacher, and R. Leeks. *Foundry Trade Journal,* v. 92, Jan. 17, 1952, p. 57-65.

Production of gray iron components. Micrographs. (E11, CI)

161-E. Some Present-Day Practices in Patternmaking. *Foundry Trade Journal,* v. 92, Jan. 17, 1952, p. 67-70.

Discussion of paper by B. Levy (July 19, 1951 issue; see item 424-E, 1951. (E17)

162-E. Small Oklahoma Plant Does Big Business in Bronze Plaques and Metal Signs. Will C. Grant. *Industrial Gas,* v. 30, Jan. 1952, p. 9-10.

Basic to the fabrication of plaques and signs is the melting of metals in gas-fired furnaces especially adapted to the needs of the process; controlled temperatures are essential to proper pouring. (E10, Cu)

163-E. Bauxite Pig Iron. *Metal Progress,* v. 61, Jan. 1952, p. 160. (Condensed from "Possibilities of Utilizing the Pig Iron Produced From Calcium-Aluminate Slag of Foundries," N. Hajto and F. Varga, *Journal of Mining and Metallurgy* (Hungary) v. 4(82) Nov. 1949, p. 483-489.)

Bauxite pig iron is low in sulfur (0.049-0.57%) and high in carbon (0.5-1.9%); therefore, its suitability as a raw material was investigated. Melting experiments were conducted in a 24-in. diam. cupola. Results of the experiments proved the suitability of this iron for manufacture of gray iron castings. (E10, Fe, CI)

164-E. Impregnation Cuts Casting Porosity Rejects. *Product Engineering,* v. 23, Feb. 1952, p. 193.

Process which utilizes thermosetting copolymers. (E25)

165-E. Fundamental Research on the Flowabilities of Melts of Metals and Alloys. I. On the Flowabilities on Sn-Bi and Pb-Sn Systems. (In English.) Tadashi Yanagihara. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 2, Dec. 1950, p. 843-855.

The fluidity is based on primary crystallization and eutectic crystallization. Both increase the viscosity of melt, but the effect of the latter

was shown to be less than that of the former. Micrographs. (E25, N12, Sn, Bi, Pb)

166-E. Improved Forming Dies Perfected; Armour Research Develops Aid To Stampers. Thomas A. Dickinson. *Steel Processing,* v. 38, Jan. 1952, p. 25-26.

Plaster patterns for casting constant-tolerance forming dies at an unprecedentedly low cost. (E16, T5)

167-E. Mechanical Sand Removal by Tumbling From Small and Medium-Sized Castings. (In French.) *Fonderie,* Dec. 1951, p. 2738-2741.

Describes and diagrams apparatus. (E24)

168-E. Some Experiments on Production of Nodular Iron. (In Spanish.) Jose Antonio Bressel Egido. *Instituto del Hierro y del Acero,* v. 4, Apr.-June 1951, p. 112-130; July-Sept. 1951, p. 197-208.

Comprehensive correlation of experiments by foreign research workers and by the author. Tables, photomicrographs, and photographs. 17 ref. (E25, CI)

169-E. Coreblowing Machines—What They Can Do for Your Foundry. John A. Mescher. *American Foundryman,* v. 21, Feb. 1952, p. 36-40.

The basic facts of core blowing. Advantages and limitations of this method of making sand cores. Schematic diagrams. (E21)

170-E. Gating Gray Iron for Production Foundries. James J. Silk. *American Foundryman,* v. 21, Feb. 1952, p. 41-42.

Gating methods successfully used for snap flask work and for heavy floor work using edge gates. Diagrams and tabular data. (E22, CI)

171-E. Synthetic Resin Corebinders; A Report of the Institute of British Foundrymen. *American Foundryman,* v. 21, Feb. 1952, p. 51-56.

Technical, economic, and health aspects of the use of synthetic resins. (E18)

172-E. Modern Foundry Methods: Low Cost Mechanization Boosts Production. *American Foundryman,* v. 21, Feb. 1952, p. 57-58.

Mechanized production at Arrow Pattern & Foundry Co., Chicago. Mechanical shakeout with automatic sand-conditioning and cooling, elevation of conditioned sand to hoppers over molding machines, 2 track conveyors for molds, with track return, for Al bottom boards, and manually operated chain hoists and monorail for molten-metal handling. (E11, A5, Al)

173-E. Gates and Heads for Steel Castings. John Howe Hall. *Foundry,* v. 80, Jan. 1952, p. 102-105, 237-242; Feb. 1952, p. 98-99, 212, 214-216, 218-220.

Factors to be considered. Methods of keeping the head molten to promote efficient feeding of the casting. Use of blind risers with steel castings. One method of determining the size of feeder head that should be applied to obtain a sound casting. (To be continued.) (E22, CI)

174-E. Symposium on Vermiculite in the Foundry. *Foundry Trade Journal,* v. 92, Jan. 24, 1952, p. 89-92.

Vermiculite products are discussed in the following papers: "Nature and Uses," J. E. Laschinger; "For Ferrous and Nonferrous Castings," G. Butler; and "For Steel Castings," A. Hirst. (E18)

175-E. Contraction and Blowholes. J. Leonard. *Foundry Trade Journal,* v. 92, Jan. 24, 1952, p. 95-98.

The theory of solidification of a casting involves liquid shrinkage, crust formation, and production of internal voids. Nomenclature and tentative definitions for various shrinkage phenomena. The net effect is illustrated by reference mainly to the American work on the influence of various conditions on the incidence of porosity. (E25)

176-E. Gray-Iron Castings. T. E. Eagan. *Mechanical Engineering,* v. 74, Feb. 1952, p. 115-117.

Rules of design necessary to achieve the desired mechanical and physical properties and a casting true to pattern and free from defects. Shrinkage rules, machining allowances, and internal stresses. (E25, CI)

177-E. Further Mechanical Aids for the Foundry. A. S. Beech. *Institution of Mechanical Engineers, Proceedings,* (Industrial Administration and Engineering Production), v. 165, W.E.P. 63, 1951, p. 27-34; disc. 34-41.

New mechanical and semimechanical devices put into practice in the foundry between 1942 and 1949 include the molding machine, brake block production and a modern knock-out station, sand preparation and reconditioning, and a multiple-belt storage hopper. Mechanization in the jobbing foundry. (E general, A5)

178-E. Investment Casting Quality Tied to Gating, Mold Turbulence. Rawson L. Wood and Davidlee Von Ludwig. *Iron Age,* v. 169, Feb. 21, 1952, p. 93-96.

Results of a study to determine physical property curves for commonly used ferrous and nonferrous alloys as secured by normal investment foundry processing. Variables investigated are: pouring temperature and its effect on grain size and ductility, investment and flask-temperature effects on grain size and

mechanical properties, effect of turbulence as controlled by gating technique, effects of standard heat treatment techniques in developing desired mechanical properties, and effects of environmental variations on final mechanical properties. (E15, Q general, SS, AY)

179-E. Fluidity and Solidification Tests for Molten Steels. W. Ruff. *Journal of the Iron and Steel Institute,* v. 170, Jan. 1952, p. 21-25.

A mold with a 400-mm. channel length and a 5-mm. channel diameter is shown to give information on the mechanism of flow, but none of the molds examined is suitable for fluidity estimations. For the control of steelmaking processes, an accurate method for determining the temperature of molten samples when solidification starts is required; a new pot mold, in which the channel is discarded, provides a sensitive sampling method that requires no built-in measuring instrument. (E25, ST)

180-E. 31-Pound Permanent Mold Casting Combines Accuracy and Economy With Exceptional Size. *Precision Metal Molding,* v. 10, Feb. 1952, p. 39, 63-64.

The permanent mold casting of an Al oil pan by Continental Motors Corp. (E12, Al)

181-E. To Maintain Alignment Between Interchangeable Magneto Components, American Bosch Uses Die Casting. *Precision Metal Molding,* v. 10, Feb. 1952, p. 40-41.

How American Bosch Corp. of Springfield, Mass., die casts Al magneto components. (E13, Al)

182-E. Better Looking Product Plus Greater Density With Investment Casting. Chas. W. Snyder. *Precision Metal Molding,* v. 10, Feb. 1952, p. 81-84.

Investment casting of nickel valve bodies, bonnets, and wedges has resulted in improved appearance, reduction in weight of metal in the finished valve, and reduction of machining scrap. Includes micrographs. (E15, Ni)

183-E. Linings for Cupolas in Open-hearth Shops. P. R. Sultzbach. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 254-256; disc., p. 256.

Experiences of the Stanley Works, Bridgeport, Conn. A bosh-type lining was used and brick consumption for relining was 28.7 lb. per ton of hot metal. (E10, D2, ST)

184-E. A Monolithic Lining for Cupolas. James L. Willis. *Proceedings. National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 257-258; disc., p. 258.

Advantages and disadvantages of using "air-emplacement process." Called the Bondactor, the gun is designed so that compressed air feeds a premixed dry grog of 45% ganister, 30% sand, and 25% fireclay to the gun nozzle, where it is hydrated in an atomized spray of water. (E10)

185-E. How to Lengthen Refractory Life. A H. Thomson. *Canadian Metals,* v. 15, Feb. 1952, p. 24-25.

Refractories for basic electric steel furnaces used in the foundry; and how to get best results from present-day materials. Lists 11 variables in furnace operation affecting lining life. (E10)

186-E. Bibliography of the Die Casting Process. Part VI. Harold Bourassa. *Light Metal Age,* Feb. 1952, p. 28, 31. (E13)

187-E. In the Foundry. Control of Temperature Gradient During Solidification. *Light Metals,* v. 15, Feb. 1952, p. 55-57.

Problems encountered in casting Al alloys. (E25, Al)

188-E. The Production of Very Small Die Castings. H. K. Barton. *Machinery* (London), v. 80, Jan. 31, 1952, p. 201-208.

Accuracy of small castings as related to die size. Various features related to center-gated dies. Methods employed for threaded components. Diagrams. (E13)

189-E. Low-Pressure Die Casting; Current Practice With Aluminium Alloys. H. K. Barton. *Metal Industry,* v. 80, Feb. 1, 1952, p. 87-88.

The cold-chamber process, using pressures of 100 atm. or higher. Mechanical properties resulting from the technique are tabulated. (E13, Al)

190-E. Sinter Layer Formation on Cast Metals. *Metal Progress,* v. 62, Feb. 1952, p. 122, 124. (Translated and condensed from "Colloidal Phenomena in Metals. XII. Explanation of the Phenomena of Crust Formation During Casting of Metals on the Basis of the Electrochemical Theory of Slags". Yu. A. Klyachko and L. L. Kunin.)

Previously abstracted from *Zhurnal Prikladnoi Khimii.* See item 14B-139, 1949. (E11)

191-E. Grain Refinement of Aluminum Alloys. *Metal Progress,* v. 62, Feb. 1952, p. 152, 154, 158. (Condensed from "The Grain Refinement of Aluminum Alloy Castings by Additions of Titanium and Boron". A. Cibula.)

Previously abstracted from *Jour-*

nal of the Institute of Metals. See item 526-E, 1951. (E25, A1)

192-E. Rare Metals Require Precision Furnacing. Frank Gibadlo. *Steel,* v. 130, Mar. 3, 1952, p. 76-78.

New concepts and techniques in the furnacing and casting of the less common metals. Use of high-vacuum techniques and inert-gas atmospheres is said to be mandatory for Ti, Zr, Ta, Ch, U, Th, Ca, and Mg. (E general, EG-b)

193-E. Simplification in the Production of Medium Sized Cast Pieces. (In Dutch.) A. Cappon. *Metalen,* v. 6, Dec. 15, 1951, p. 441-447.

Improved system for sand casting fairly large iron structures. The method is called "molding with the joint facing upwards". Important savings in sand, handling, and time are claimed. Cement sand can replace loam in the semipermanent mold system described. For certain castings, the mold may be fully permanent. (E11, E12, CI)

194-E. Sand Treatment. Part 1. A. S. Beech. *Canadian Metals,* v. 15, Feb. 1952, p. 28, 30-31.

The characteristics of an efficient sand mill, contrasting batch with continuously operating mills. Stresses the importance of control of grain size, moisture content, and reconditioning sand. (To be continued.) (E18)

195-E. Steel Founders' Society Marks Fiftieth Anniversary. *Foundry,* v. 80, Mar. 1952, p. 86-91, 249.

New developments in foundry practice; research promoted by the society. (E general, A9, CI)

196-E. Limited Mechanization in the Jobbing Foundry. Edwin A. Swensson. *Foundry,* v. 80, Mar. 1952, p. 92-95, 247-249.

Department-by-department mechanization carried out by General Foundry & Mfg. Co., Flint, Mich., a gray-iron foundry of diversified production. (E11, A5, CI)

197-E. Hardware Castings Produced in Modern Nonferrous Foundry. Edwin Bremer. *Foundry,* v. 80, Mar. 1952, p. 98-101, 172.

Production at Attwood Brass Works, Grand Rapids, Mich. Materials include Al, Mn bronze, Sn bronze, brass, bearing bronze, etc. (E11, Al, Cu)

198-E. Modern Trends in Molding Machines and Core Blowers. George E. Miller. *Foundry,* v. 80, Mar. 1952, p. 102-105, 215-216. (E19, E21)

199-E. Experimental Production of Nodular Graphite in Cast Iron. Alexander I. Krynitsky and Harry Stern. *Foundry,* v. 80, Mar. 1952, p. 106-111, 243-246.

An investigation conducted to study the effect of composition, melting and pouring temperatures, nucleation technique, and cooling rate, and of such addition agents as Mg, MgO, magnesite, FeS, Ca, Ni, Cr, Mo, and B on the formation of nodular graphite in cast iron. This study supports the belief that nodular graphite is formed in the melt during solidification, and graphite patches are produced after solidification by decomposition of carbides. (To be continued.) (E25, CI)

200-E. Effect of Raw Materials on Cupola Operation. Bernard P. Mulcahy. *Foundry,* v. 80, Mar. 1952, p. 144, 148, 153.

Effect on quantity and quality of pig iron. (To be continued.) (E10, B22, Fe)

201-E. One Way to Repair a Damaged Casting. Pat Dwyer. *Foundry,* v. 80, Mar. 1952, p. 259-261.

Method of patching a gray iron casting by pouring molten metal into the cavity and at the same time fuzing the surface so the patch becomes a part of the casting. (E general, CI)

202-E. Further Discussion of Resin in Foundry Practices. *Foundry Trade Journal,* v. 92, Feb. 14, 1952, p. 175-177.

Discussion on a paper "Synthetic Resins in the Foundry", G. L. Harbach and P. G. Pentz, published in July 5, 1951 issue. See item 401-E, 1951. (E18)

203-E. Investment Casting. *Machinery* (London), v. 80, Feb. 21, 1952, p. 311-319.

Review of equipment, methods and techniques employed by Birmingham Small Arms Co., Ltd., Sparkbrook, Birmingham, England. Application is to low-alloy steels. (E15, AY)

204-E. Precision Casting. M. Pomey. *Microtechnic* (English Ed.) v. 5, Nov.-Dec. 1951, p. 325-342; disc. p. 343-344. (Translated from the French.)

The wax pattern and plaster-mold method (E15, E16)

205-E. Pressure Casting. M. Grunberg. *Microtechnic* (English Ed.), v. 5, Nov.-Dec. 1951, p. 353-364; disc., p. 365. (Translated from the French.)

The method, hot and cold chamber machines, alloys used, and possibilities and future of die casting. Diagrams and tabular data. (E13)

206-E. Sealing Metal With Metal; Tincher Impregnation Process for Salvaging Porous Castings. D. W. Holmes. *Modern Metals,* v. 8, Feb. 1952, p. 53-54.

Process used by Tincher Products Co., Sycamore, Ill. which employs

metallic oxides as sealants for castings. Process can be used for the impregnation of Al, Mg, and Zn die castings as well as for sand cast iron, steel, stainless, bronze, brass, Al and Mg. (E25)

207-E. Unusual Techniques Developed for Precision Castings at AiResearch. *Western Metals,* v. 10, Feb. 1952, p. 40.

Two basic techniques are utilized in the company's casting operations —centrifugal for the production of high-speed wheels, and static sand casting for cast iron parts which fall generally into the classification of nonmoving. In its static sand castings of the pressure type, AiResearch utilizes virgin ingot with Mg added to bring the casting metal up to desired standards. (E14, E11, CI, Mg)

208-E. Die-Casting Machines. (In French.) R. Grunberg. *Métallurgie et la Construction Mécanique,* v. 83, Dec. 1951, p. 983-984, 987, 989.

Cold-chamber, hot-chamber, and vertical cold-pressure chamber machines. Advantages and disadvantages of cold-chamber machines. Diagrams and photographs. (E13)

209-E. Use of Heat-Radiating Liners for Risers in Steel Castings. (In German.) E. Lanzendörfer. *Giesserei,* v. 38, Dec. 27, 1951, p. 661-664.

A new British process for heating the sides of liners and in this way keeping the melt warm much longer than usual. Method of operation advantages. (E22, CI)

210-E. Innovations and Possibilities for Development in Foundry Mechanization. (In German.) E. Knipp. *Giesserei,* v. 29, Jan. 10, 1952, p. 2-6.

Diagrams and illustrations show possibilities. Methods for mechanizing the foundry process by shortening the transportation within the plant and decreasing the amount of material involved in casting. Utilization of waste sand and various types of new machinery for continuous casting. (E general, A5)

211-E. Lost Wax Casting Process in Foundry Practice. (In German.) W. Heimann. *Giesserei,* v. 29, Jan. 10, 1952, p. 6-9.

Advantages in savings of material and casting of material of poor machinability; future possibilities. (E15)

212-E. Coke Charge and Coke Quality for Cupola Melting. (In Swedish.) W. von Preen. *Gjuteriet,* v. 41, Dec. 1951, p. 183-185.

Problems involved in use of poor-quality coke and methods for minimizing the difficulties encountered. (E10, CI)

213-E. (Book) **Casting Alcoa Alloys.** 135 pages. 1951. Aluminum Co. of America, Gulf Building, Pittsburgh 19, Pa.

General characteristics, foundry considerations and principles, heat treatment, mechanical and physical properties, and numerous applications. (E general, Al)

214-E. (Book) **Foundry Work.** Edwin W. Doe. 109 pages. 1951. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $1.76.

Presents the simple principles of foundry practice, first by referring to the several phases of the industry in a general way, and secondly by arranging a series of molding problems that will exemplify the application of this knowledge in a practical manner. (E general)

215-E. Cross-Section of a Non-Ferrous Jobbing Foundry. J. Gorman. *Foundry Trade Journal,* v. 92, Feb. 21, 1952, p. 189-199; Feb. 28, 1952, p. 229-231.

Foundry practice in author's shop in Scotland. (E general, A5, EG-a)

216-E. Design of Iron Castings. K. H. Collinson. *Foundry Trade Journal,* v. 92, Feb. 28, 1952, p. 217-219; disc., p. 219-221.

Development of new conceptions in industrial design. Foundry methods for woodworking tools. Casting quality and finish and relation to cost. (E general, CI)

217-E. History of Aluminium-Alloy Casting. A. P. Fenn. *Foundry Trade Journal,* v. 92, Feb. 28, 1952, p. 223-228.

Various aspects of the developments that have taken place in the Al foundry during the past 40 years. (E general, Al)

218-E. Pressure Die Casting. *Metal Industry,* v. 80, Feb. 29, 1952, p. 169-170.

The plant layout of the High Duty Alloy Ltd., Slough, Bucks. (E13)

219-E. Plaster Mold Castings Are Tougher and Smoother Than Sand Castings of the Same Alloy. T. H. Kummer. *Precision Metal Molding,* v. 10, Mar. 1952, p. 27-30.

Savings and improvements attained by Cherry-Burrell Corp. in converting from 22% Ni-bearing Cu-alloy sand casting to 15% Ni-brass plaster-mold castings to produce sanitary filling and capping machinery. Includes barrel-polishing techniques. (E16, L10, Ni, Cu)

220-E. A Review of Factors Influencing the Use of Permanent Mold Castings. *Precision Metal Molding,* v. 10, Mar. 1952, p. 31, 66-68.

Includes a comparison with sand and die castings. (E12)

221-E. High-Speed, High-Strength Part Is Produced by Investment Cast-

ing. Louis C. Blesch. *Precision Metal Molding,* v. 10, Mar. 1952, p. 42-43.

Comparison with sand-cast and forged parts. Part is made from an alloy steel MC-6 of Michigan Steel Casting Co.; its housing from Al. (E15, AY, Al)

222-E. The Sand-Block Casting Process. (Flaskless Casting Process.) (In German.) R. Weidner. *Giesserei,* v. 39, Jan. 24, 1952, p. 25-29.

Production of metal patterns. Advantages of methods and production figures tabulated. Possibilities of application are shown by examples taken from foundry practice. (E11, E17)

223-E. Grain Formation in Steel Produced in Small Converters and Its Annealing. (In German.) F. Roll. *Giesserei,* v. 39, Jan. 24, 1952, p. 30-31.

Effects of various factors, especially composition and annealing temperatures. (E25, J23, CI)

224-E. Preliminary Work on the Commercial Production of Cast Iron With Nodular Graphite in Poland. (In German.) *Giesserei,* v. 39, Jan. 24, 1952, p. 31-32. (From *Przeglad Odlewnictwa,* v. 1, No. 1, 1951, p. 3-4.)

Includes photomicrographs. (E25, CI)

225-E. Working With Synthetic Molding Sand. (In German.) H. Herschenz. *Giesserei,* v. 39, Feb. 7, 1952, p. 54-56.

Synthetic molding sand mixed with 0.75-1.5% bentonite and 6-7% water yields fully satisfactory castings. Data are graphed and tabulated. (E18)

226-E. Research on Segregation in High-Strength Mg-Al Alloys. (In German.) G. Siebel. *Metall,* v. 6, Feb. 1952, p. 64-69.

Development of the forgeable Mg alloys AZ855 (7.0-7.5% Al, 1.0-1.5% Zn, 0.1% Mn). These alloys can be forged most economically when cast by the continuous process in which most nonmetallic and excess metallic compounds are segregated. Photographs, photomicrographs, diagrams, and tables. 10 ref. (E25, F22, Mg)

227-E. Experiences and New Information Concerning Aluminum Chill Casting. Gustav Lauterjung. (In German.) *Metall,* v. 6, Mar. 1952, p. 129-133.

Examples in precision casting and the casting of bulky pieces. Data are charted. (E23, Al)

228-E. Contribution to the Production of Cast Iron With Spheroidal Graphite. (In German.) Borut Marincek. *Von Roll Mitteilungen,* v. 10, June-Dec. 1951, p. 14-44.

The reactions taking place in molten cast iron. Experiments in the production of nodular cast iron by addition of pure Mg. The formation of nodular graphite and differences in the forms of graphite in cast iron are explained in terms of the surface tension of molten cast iron. Graphs, tables, diagrams, and photomicrographs. 25 ref. (E25, CI)

229-E. Centrifugal Casting. (In Swedish.) H. Jungbluth. *Gjuteriet,* v. 42, Jan. 1952, p. 1-10.

Mathematical and physical laws of centrifugal castings. Historical review; practical aspects of centrifugal casting of tubes, cylinder linings, and other tubular goods. Numerous diagrams, graphs, photographs, and micrographs. (E14)

230-E. Specifications for Pulverized Coal for Molds and Directions for Its Testing. (In Swedish.) *Gjuteriet,* v. 42, Jan. 1952, p. 13-14.

Developed by a Swedish committee on foundry molding materials. (E19)

231-E. Bonding Material for Small Castings; Surface Tension Bonds for Sand. W. A. Snyder. *American Foundryman,* v. 21, Mar. 1952, p. 38-41.

Experiments to produce molding-sand mixtures with suitable combinations of strength, permeability, and deformation for light molding, using only the surface tension of a fluid as a binder. (E18)

232-E. Pressure Casting Aluminum. *American Foundryman,* v. 21, Mar. 1952, p. 45-48.

Operations at Scientific Cast Products Co., Cleveland and Chicago, for making cast Al patterns and matchplates. (E16, Al)

233-E. Magnesite For Molding. S. G. Urane. *American Foundryman,* v. 21, Mar. 1952, p. 49-50.

Results of job-tested experiments show that magnesite can replace silica flour as a general mold and core wash and in treating facing sand to reduce its permeability. How to prepare the magnesite, properties, compounding techniques, and application methods for the wash; typical facing-sand mixtures, and helpful suggestions on sound practice. (E18)

234-E. Clay Determination Procedure Improved; Testing Sand With Included Combustibles. *American Foundryman,* v. 21, Mar. 1952, p. 59.

The standard siphoning procedure for determining A.F.S. clay does not distinguish between mineral and combustible matter such as wood, flour, cereal, and sea coal. The test detailed here, however, determines clay in the presence of such organic

material and is thus well suited for used molding sand. (E18)

235-E. Process and Product Advantages of Gray Iron Castings. C. O. Burgess. *American Foundryman,* v. 21, Mar. 1952, p. 60-64. (Condensed from "Advantages of the Gray Iron Casting Process and Products".)

See abstract from *Gray Iron Founders Society;* item 50-E, 1952. (E11, CI)

236-E. Core Removal and Cleaning of Castings by the Wet Process. W. Russell. *British Cast Iron Research Association Journal of Research and Development,* v. 4, Feb. 1952, p. 263-268; disc., p. 268-271.

Plant and equipment required, and the method of charging the castings into the cleaning chamber. A typical analysis of the blast sand, the molding sand, and reclaimed sand. Water reclamation plant. Illustrated. (E24, L10)

237-E. Some Experience With Cupola Spark and Dust Arresters. W. Y. Buchanan. *British Cast Iron Research Association Journal of Research and Development,* v. 4, Feb. 1952, p. 272-279; disc., p. 279-282.

Various types of impurities given off from cupola stack. Development and improvements in the design of wet spark arresters which have taken place in recent years, chiefly in America. In an early design of arrester, accelerated corrosion of the pipes took place due to concentrations of sulfur compounds in the circulated water. Means of minimizing the corrosion problem. (E10, R7)

238-E. Frequency Conversion Might Well Affect Melting Technique. J. Morgan. *Canadian Metals,* v. 15, Mar. 1952, p. 32.

Advantages of program being carried out in Ontario to convert from 25 to 60-cycle power. (E10)

239-E. Foundry Mechanization. Part 2. A. S. Beech. *Canadian Metals,* v. 15, Mar. 1952, p. 34, 36, 39.

Several British innovations that have been thoroughly tested. Presents criticism of American technique. (E general)

240-E. Valve Production at Crane. *Canadian Metals,* v. 15, Mar. 1952, p. 44, 46.

Foundry practice at Crane, Ltd., Montreal, Canada. Materials include brasses, cast irons, malleable iron, Ni-base alloys, and special alloy steels. (E11, CI, AY, Ni)

241-E. Ferranti Foundry; Innovations in Mechanized Production. V. C. Faulkner. *Foundry Trade Journal,* v. 92, Feb. 7, 1952, p. 139-144; Feb. 14, 1952, p. 165-168.

Layout at Ferranti Ltd., Lancashire, England. (E general)

242-E. Moulding in an Indian Foundry. S. G. Athanikar. *Foundry Trade Journal,* v. 92, Mar. 13, 1952, p. 271-277.

Equipment and procedures for production of large iron sand castings. (E11, CI)

243-E. Discussion on Cupola Practice. *Foundry Trade Journal,* v. 92, Mar. 13, 1952, p. 286-287, 290.

Presented at recent meeting of East Midlands branch, Institute of British Foundrymen. (E10, CI)

244-E. Machine Makes Cores Faster, Cheaper, Better. Herbert Chase. *Iron Age,* v. 169, Mar. 27, 1952, p. 93-97.

How complex cores can be rammed better, faster, and at lower cost in a new automatic coremaking machine in use at Buick. Only hand operations left are inserting wires where needed, putting driers in place, and transferring driers with cores to the baking-oven conveyer. Boxes, which may be cast iron or Al, are not touched by hand. Five table stations index smoothly through five stations. A modified Geneva indexing motion helps avoid shocks in accelerating and decelerating. (E21)

245-E. Electric Furnaces for Melting of Nonferrous Metals. G. H. Clamer. *Journal of the Electrochemical Society,* v. 99, Mar. 1952, p. 65C-68C.

A review. (E10, C21, EG-a)

246-E. Fundamental Study of Precision Casting. I. Experiments on Bronze Casting. (In Japanese.) Kazuo Katori, Tsuneyuki Okakura, and Yotaro Shindo. *Journal of Mechanical Laboratory,* v. 5, Nov. 1951, p. 312-319.

The lost-wax process was studied. Several beeswax patterns cast in a $CaSO_4$ mold were investigated. Coating and investment materials were natural and heat treated silica sands. Bonding material was a solution of hydrolyzed ethyl silicate. A standard gunmetal was poured. (E15, Cu)

247-E. The Osborn-Shaw Process of Precision Casting. *Machinery* (London), v. 80, Mar. 20, 1952, p. 506-507.

Experimentally developed and tested over a period of five years by Shaw Processes Ltd., Newcastle-Upon-Tyne, and employed for full-scale commercial production in a specially equipped precision foundry. Work already undertaken has included the casting of machine parts to an accuracy of 0.005 in., and production of dies for die casting, stamping, forging and extrusion, and for glass, rubber, and plastics. Materials already cast with success include Al and Mg alloys, brasses and bronzes, Fe, carbon steels, stainless

steel, high-alloy steels, Steelite, Vitallium, and tungsten hard-facing alloys.
(E15, Al, Mg, Cu, Fe, CN, SS, AY, W)

248-E. The Impending Revolution in Casting Processes. H. H. Harris. *Metal Progress,* v. 61, Mar. 1952, p. 65-69.

Developments in the arts and sciences in casting of metals and their possible and probable benefit to defense and the national economy. Dimensional accuracy, chemistry-structure relationship, and tooling for improved quality and quantity with respect to the need for elevating the casting industry to higher levels of application and service.
(E general)

249-E. An Unusual Tin Bronze Casting. Harold J. Roast. *Metal Progress,* v. 61, Mar. 1952, p. 76-79.

Operations at Baldwin-Lima-Hamilton Corp., Eddystone, Pa., for making a tin bronze pump casing. The furnace, metal, mold, cooling period, cleaning and testing. (E11, Cu)

250-E. Resin Binders for Foundry Sand. *Metal Progress,* v. 61, Mar. 1952, p. 126-127.

See abstract of "Synthetic Resins in the Foundry", by P. G. Pentz, *Metal Industry;* item 385-E, 1951.
(E18)

251-E. Large Castings; Berkeley Foundry Plays Large Part in Synthetic Rubber Picture. *Western Machinery and Steel World,* v. 43, Mar. 1952, p. 99.

Sand casting of drum shells for filters used in synthetic-rubber plants. (E11, CI)

252-E. Use of Machine-Poured Pig Iron. Remelting Tests on Hematite Pig Iron Cast in Sand and Automatically. (In Italian.) A. Scortecci, W. Demicheli, M. Drufuca, and A. Palazzi. *Metallurgia Italiana,* v. 44, Feb. 1952, p. 55-72; disc., p. 72.

Automatic pouring of pig iron, its advantages and disadvantages. Methods and results of experiments carried out on a commercial scale in a blast furnace and in a cupola to compare mechanical properties and microstructures of cast iron obtained from two kinds of pig iron differing only in the method of pouring. Tables, micrographs, charts, and diagrams. 16 ref. (E23, CI)

253-E. Production of Quality Cast Tools. (In Russian.) P. S. Pershin and B. A. Alekseev. *Stanki i Instrument,* v. 22. Aug. 1951, p. 22-25.

The casting of special high speed steel tools. (E11, TS)

254-E. Gates and Heads for Steel Castings. John Howe Hall. *Foundry,* v. 80, Mar. 1952, p. 112-115, 257-258; Apr. 1952, p. 104-107, 255-257.

Use of the Washburn or necked-down head. Center-line shrinkage in steel castings and methods of securing directional solidification. How to employ padding and metal chills in order to obtain directional solidification of steel castings. 29 ref.
(E22, CI)

255-E. Casting Steel in Dry Sand Molds. Samuel R. Robinson. *Foundry,* v. 80, Apr. 1952, p. 170-171.

Recommended procedure followed by a Midwest steel foundry. They differ somewhat from orthodox practice. Diagrams. (E11, CI)

256-E. Experimental Production of Nodular Graphite in Cast Iron. Alexander I. Krynitsky and Harry Stern. *Foundry,* v. 80, Apr. 1952, p. 98-99, 241, 243-244, 246-247, 249.

Effect of treatment with FeS, B, MgO, magnesite, Ca and Ni-Cr-Mo on the graphite structure of cast iron. Photomicrographs and tabular data. 17 ref. (E25, M27, CI)

257-E. Design of Gray Iron Castings. Thomas E. Eagan. *Foundry,* v. 80, Apr. 1952, p. 108-110, 261, 263.

Factors involved with respect to the best and simplest design to attain required properties. (E11, CI)

258-E. Connor-Block Feeder; Simplified Universal Application by Means of an Oil-Sand Core. H. London, D. Neill, and J. C. Dowie, *Foundry Trade Journal,* v. 92, Mar. 6, 1952, p. 243-247.

Constructional details for forming a Connor-block and runner—a slit runner abutting onto the edge of a casting—by means of an oil-sand core. Through this feeder block and runner, metal from the downgates flows into the mold and in doing so heats adjacent corner edges of sand and thus promotes directional solidification and feeding from the reservoir contained in the "block." Application of this method to a pinion blank, a strickled mold, and to dry-sand work, as well as full particulars of metal and sands used. (E22)

259-E. Further Mechanical Aids for the Foundry. A. S. Beech. *Foundry Trade Journal,* v. 92, Mar. 13, 1952, p. 279-283; Mar. 27, 1952, p. 331-335. (A condensation.)

Innovations that have taken place since 1942, with special reference to the mass-production plant of British Railways at Horwich; light, medium, and heavy foundries; and strides that have been made in semi-mechanization of the jobbing foundry. (E general)

260-E. Experiences With the Investment Casting Process. D. F. B.

Tedds. *Foundry Trade Journal,* v. 92, Mar. 20, 1952, p. 297-310.

Possibilities and limitations. Special components cast on an experimental basis were burner stems, pitot combs and tubes, and combustion chambers for turbine engines. Such production aspects as injection dies, wax-pattern production, molding and investing, secondary investment, alternative bonds, compacting, drying and firing, high-temperature oven, casting, and inspection and technical control. Tabular data on defects. (E15)

261-E. Swarf Melting in the Cupola. *Foundry Trade Journal,* v. 92, Mar. 20, 1952, p. 313-314.

Two methods of swarf melting as a conservation measure, one being to charge swarf as it comes from the machine-shops directly into the cupola. The second consists of first briquetting the swarf by mixing with cement and allowing it to harden into blocks before charging to the cupola. The 1st method was adopted because it is cheaper, although it has a higher melting loss. (E10, A8, CI)

262-E. Origin of Porosity in Castings of Magnesium-Aluminum and Other Alloys. E. J. Whittenberger and F. N. Rhines. *Journal of Metals,* v. 4, April 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 409-420.

The formation of casting porosity is viewed as a nucleation and growth process with solidification shrinkage and gas precipitation as cooperative driving forces. Experimental evidence evaluating the individual contribution of each force confirms the major premise that microporosity is nucleated by gas precipitation. Effects of identity and quantity of gas, temperature range of freezing; and of freezing rate upon amount and distribution of porosity in light-metal castings. Graphs, sketches and microradiographs. 17 ref. (E25, N12, Mg, Al)

263-E. Degassing With Lithium. *Metal Industry,* v. 80, Mar. 7, 1952, p. 191-192.

Experiments made to obtain a more efficient and reliable method of degassing Cu and Ni alloys under existing melting conditions, and cleaner metal after deoxidation. One of the several findings of this investigation was the possibilities and merits of the use of Li metal. The best average addition is 0.005% Li added immediately before casting and after deoxidation had been carried out with 0.08% Mg. Alloys treated and notes on type of casting produced. (E25, Cu, Ni)

264-E. Spheroidal-Graphite Cast Iron for Crankshafts. *Metal Progress,* v. 61, Apr. 1952, p. 126-128, 146, 148. (Condensed from "Cast Iron Crankshafts, With Special Reference to Acicular and Spheroidal-Graphite Cast Irons", A. B. Everest.)

Previously abstracted from *Foundry Trade Journal.* See item 101-E, 1952. (E general, T21, CI)

265-E. An Appraisal of the Shell Molding Process. Harold J. Roast. *Metal Progress,* v. 61, Apr. 1952, p. 71-74.

The process, requirements, molding and casting procedure. (E11)

266-E. Size Classification and Permeability of Foundry Sands. (In French.) Philippe Jasson. *Fonderie,* v. 73, Feb. 1952, p. 2795-2804.

Calculation of the theoretical specific surface of a sand, determination of its fineness-permeability relation, experimental verification of this relation, and some of its practical applications. Tables and charts. (E18)

267-E. Improved Cupolas. (In French.) Gabriel Joly. *Fonderie,* v. 73, Feb. 1952, p. 2805-2809.

Improvements made in cupolas with respect to balancing the blast, reheating the air, and oxygen enrichment of the air. Tables and diagrams. (E10)

268-E. Device Enabling Casting by One Person. (In French.) *Fonderie,* v. 73, Feb. 1952, p. 2810-2814.

Device contains a ladle and its weighing mechanism, suspension straps, a system for lifting from the ladle, protection apparatus, and a movable trolley on a single-rail track. (E23)

269-E. Note on the Deoxidation of Brasses. (In French.) *Fonderie,* v. 73, Feb. 1952, p. 2818-2819.

Additions of silica and phosphorus. Data are tabulated. (E25, Cu)

270-E. History of Aluminium-Alloy Casting. *Foundry Trade Journal,* v. 92, Mar. 6, 1952, p. 251-254.

Discussion of above paper by A. P. Fenn (Feb. 28 issue; see item 524-E, 1951.) (E25, Q general, Al)

271-E. Standards for Rough Chipping and Removing Welds. Dean Van Order. *American Foundryman,* v. 21, Apr. 1952, p. 120-124.

A timestudy system, and a recording minute meter. Diagrams and tabular data. (E24, A6)

272-E. Practical Suggestions for the Building of Wood Patterns. W. H. Siebert. *American Foundryman,* v. 21, Apr. 1952, p. 132-134.

Construction of a pattern for a specific large machine tool casting. Diagrams. (E17)

273-E. Quality Control Program for a Steel Jobbing Foundry. H. H. Fairfield. *American Foundryman,* v. 21, Apr. 1952, p. 135-137.

Application at William Kennedy & Sons Ltd., Owen Sound, Ont. Carbon, alloy, and manganese steels are poured for castings ranging from 1 lb. to 5 tons. (E11, S12, CI)

274-E. Practical Aspects of Olivine as a Molding Material. John Sissener and Bjorn Langum. *American Foundryman,* v. 21, Apr. 1952, p. 138-142.

Properties and performance in steel and iron casting as used in Norway. Technically advantageous for manufacture of Mn and Cr-Ni steel. Chief reason for use is in the presumed diminishing of silicosis risk. Equilibrium diagrams and photographs. 11 ref. (E19, CI)

275-E. Risering Castings. J. B. Caine. *American Foundryman,* v. 21, Apr. 1952, p. 143-149.

Difficulties with use of closely spaced risers required to meet feeding distances. Methods to overcome these difficulties and to enable the foundry to produce castings free from dispersed shrinkage with minimum number of reasonably sized risers and an acceptable yield. Diagrams and graphs. 12 ref. (E22, CI)

276-E. Fifty-Year Reviews. *Foundry Trade Journal,* v. 92, Mar. 15, 1952, p. 9-33, 39-43, 49-55, 57-86.

A series of reviews written for the golden jubilee issue: From the Editor's Viewpoint, V. C. Faulkner; Five Hundred Years' Ironfounding Crammed Into 50 Years, J. J. Sheehan; Evolution of the Equipment Industry, J. Blakiston; Perpetual Interest of Non-Ferrous Research, G. L. Bailey; Consolidation of Bronze and Brass Founding, F. Hudson; Pipe-Dreams to Practice in Cast Iron Research, J. G. Pearce; Phenomenal Growth in Light Alloys, E. G. West; America Outstripped in Malleable Practice, F. D. Ley; and Cooperation in Steelfounding, F. Rowe. (E general, A2)

277-E. Cut Mold Costs With Cement Sand. N. A. Jeppesen. *Iron Age,* v. 169, Apr. 17, 1952, p. 116-119.

Advantages. (E18)

278-E. Controlled Solidification Cuts Die Finishing Costs. *Iron Age,* v. 169, Apr. 24, 1952, p. 140-141.

Procedure can save 50-75% of costs in finishing of large Kirksite forming dies. Shrinkage rates and warpage can be accurately controlled. Flexible water hose and high-temperature insulation help in casting dies close to finished size. Includes graphical interpretation. (E25)

279-E. Iron and Steel Castings; Production at Sprotborough Foundry. P. McA. Martin and J. A. Cooper. *Iron and Steel,* v. 25, Apr. 1952, p. 117-120.

(E general, CI)

280-E. Producing a Large Gravity Casting. *Light Metals,* v. 15, Apr. 1952, p. 116-117.

(E11, CI)

281-E. Metal Injection: A Reassessment of the Position With Regard to Die-Casting Dies. (Concluded). **Part I, II, III, IV, and V.** H. K. Barton. *Metal Industry,* v. 80, Feb. 22, 1952, p. 149-151; Feb. 29, 1952, p. 171-173; Mar. 7, 1952, p. 187-188; Mar. 14, 1952, p. 205-206; Mar. 28, 1952, p. 243-245.

An analysis of metal flow into dies. Effects of viscous shear, and validity of statement that viscous shear results in the kinetic energy of the stream being partly transformed into heat. Characteristics of the metal stream. Values of constants for the various alloy groups. How flow within the cavity can be controlled by varying the shape, size and location of the gate, or gates, and how flow along the runners can be controlled so as to make the best use of the heat resulting from the degradation of kinetic energy. Tabular data. (E13, CI)

282-E. A Contribution on the Metallic Mould Blowing Reaction. V. Kondic, G. Martin, and K. Bromage. *Metallurgia,* v. 45, Mar. 1952, p. 127-130.

The reaction at the metal-mold interface which gives rise to "blowing" at the surface of a chill casting is essentially one of oxidation of the C in the mold material. It can be treated quantitatively with a good approximation by using the thermodynamic data of substances involved in the reaction. By providing at the interface metals of comparatively higher affinity for O than that of C, the reaction can be reduced and "blowing" completely eliminated. Diagrams and photographs. (E25)

283-E. Core Extraction Forces Required in Pressure Die Casting. W. M. Halliday. *Metallurgia,* v. 45, Mar. 1952, p. 132-134.

Die and operating factors governing scale of gripping pressures between sides of a cored hole and core. Gives a rule whereby such pressures may be estimated at design stage. (E13)

284-E. New H.D.A. Pressure Die Casting Foundry at Slough. *Metallurgia,* v. 45, Mar. 1952, p. 139-140.

Largest British pressure die casting machine, capable of producing castings weighing 30 lb. (E13)

285-E. Non-Flammable Hydraulic Fluid for Die Casting Machines; a Report on Properties and Performance. *Precision Metal Molding,* v. 10, Apr. 1952, p. 46-47, 80, 106.

Deals with Monsanto Chemical Co.'s Pydraul F-9, a phosphate-based material. (E13)

286-E. Prototype Die Castings Produced by Investment Casting for Preliminary Testing and Study. *Precision Metal Molding,* v. 10, Apr. 1952, p. 50-51, 100-101.

Several examples at Kerr Manufacturing Co., Detroit. Aids in styling, selecting proper alloy, etc. (E15)

287-E. Die Castings Replace Sand Castings to Save More Than 60 Percent. *Precision Metal Molding,* v. 10, Apr. 1952, p. 42-43, 102-104.

Evolution from sand casting to die casting in development of oscillograph and penmotor manufactured by Brush Development Co., Cleveland. Zn alloy is used. (E13, Zn)

288-E. Investment Casting Can Cut Costs. R. Warrington. *Precision Metal Molding,* v. 10, Apr. 1952, p. 45, 104-106.

A leaf-type gun sight made of 1035 carbon steel by Adapti Co., Cleveland. (E15, CI)

289-E. New Data on Ductile Cast Iron. *Technical News Bulletin* (National Bureau of Standards), v. 36, Apr. 1952, p. 49-50.

See abstract of "Experimental Production of Nodular Graphite in Cast Iron", Alexander I. Krynitsky and Harry Stern, *Foundry;* items 199-E and 256-E, 1952. (E25, M27, CI)

290-E. Historical Notes on the Foundry Industry in the USSR. (In Russian.) Adolf M. Plesinger. *Hutnické Listy,* v. 7, Jan. 1952, p. 15-19.

Development of the Russian foundry industry. Principal activities of many leading metallurgists. (E general)

291-E. Observations on Dimensional Defects in Sand-Cast Pieces. (In French.) René Chion. *Fonderie,* Jan. 1952, p. 2763-2773.

Nature of the equipment, resistance of the equipment and the mold, quality of the manpower, shrinkage, and forcing. Schematic drawings. (E11)

292-E. Sand for Green Casting of Brass Cocks. (In French.) *Fonderie,* Jan. 1952 p. 2786.

Characteristics of sand recommended. (E18, Cu)

293-E. A Complex Precision Casting. (In French.) *Fonderie,* Jan. 1952, p. 2774-2778.

Production of a steam-heated vat, of high-grade cast iron, intended for the chemical industry. It includes a flange, a cylinder, a convex bottom, five bosses including a center one, a small pipe branch, four grooves connecting the five bosses, four external grooves, and three steel coils for heating. Photographs and diagrams. (E15, CI)

294-E. Heat Flow in Moist Sand. Victor Paschkis. *American Foundrymen's Society,* Preprint 52-4, 1952, 6 pages.

An extension of work described in a 1951 report, to cover the case of an initial moisture content of 6%. Data are charted and tabulated. (E18)

295-E. Veining Tendencies of Cores. *American Foundrymen's Society,* Preprint 52-6, 1952, 5 pages.

Progress report on factors that affect the presence of metal fins, not at the core parting, but on cored surfaces of castings. The study of veining is limited to iron castings. The Committee has established that veining can be produced or eliminated by selection of base sands, binders, metal pouring temperature, degree of ramming, degree of baking, percentage of binders, and, in some cases, moisture. Data are extensively tabulated and charted. (E21, CI)

296-E. Core Boxes From Core Plugs. James N. Mathias. *American Foundrymen's Society,* Preprint 52-7, 1952, 4 pages.

Development of Al core boxes from wood or metal master core plugs. Advantages to the pattern shop previous to obtaining the casting. Suitable pattern equipment furnished by various pattern shops. (E21, Al)

297-E. Solidification of Nodular Iron in Sand Molds. R. P. Dunphy and W. S. Pellini. *American Foundrymen's Society,* Preprint 52-9, 1952, 7 pages.

Experiments in which the mechanism and course of the process was studied on a macro scale, using standard test castings. The course of solidification was followed by observing temperature changes through the casting at its vertical midpoint, using a special thermocouple setup. Data are charted and tabulated; microstructures. (E25, M27, CI)

298-E. Aluminum Sand Casting Defects; Their Identification, Causes and Corrections. Donald A. LaVelle. *American Foundrymen's Society,* Preprint 52-12, 1952, 13 pages.

Illustrates a majority of common

defects. Probable causes and suggestions for elimination. (E25, Al)

299-E. Effects of Melting Furnace Atmosphere on Fluidity, Hot Tearing Tendency, and Other Properties of Malleable Iron. E. A. Lange and R. W. Heine. *American Foundrymen's Society,* Preprint 52-13, 1952, 12 pages.

The results presented pertain to metal properties produced by holding a molten iron at 2700° F. for 1 hr. under atmospheres developed by CO, CO_2, N_2, water vapor, H_2, and A. Tables and graphs. (E25, Q general, CI)

300-E. Pneumatic Reclamation for Foundry Sands. Clifford E. Wenninger. *American Foundrymen's Society,* Preprint 52-15, 1952, 7 pages.

Laboratory, pilot-plant, and commercial development of an "air-scrubber". Characteristics and economics of a commercial installation. Diagrams, tables, and illustrations. (E18)

301-E. Practical Consequences of Space, Time and Temperature Relations During Casting of Metals. J. S. Abcouwer. *American Foundrymen's Society,* Preprint 52-19, 1952, 5 pages.

Mathematical treatment; making use of a temperature discontinuity at the metal-mold interface, gives a temperature distribution in accord with recently published experimental results. Formula for the dimensioning of risers and heads. (E22, E23)

302-E. Mineral Perlite and Its Use in the Foundry. E. D. Boyle and H. R. Wolfer. *American Foundrymen's Society,* Preprint 52-21, 1952, 8 pages.

This volcanic mineral, when puffed up into a flour-like mass by quick heat, is an excellent insulating collar and cover for risers. (E22)

303-E. Air Furnace Refractory Practice in Cupola-Air Furnace Duplexing. William C. Corbéau. *American Foundrymen's Society,* Preprint 52-27, 1952, 3 pages.

At National Malleable & Steel Castings Co., Cleveland. (E10, CI)

304-E. Investment Casting of Aluminum. H. Rosenthal and S. Lipson. *American Foundrymen's Society,* Preprint 52-39, 1952, 6 pages.

Mechanical properties of Al test bars produced by investment casting were found to approximate those obtained by sand casting methods. Tables, graphs, macrographs. (E15, Al)

305-E. Sand Control With Particular Reference to the Prevention of Scabbing. W. B. Parkes. *American Foundrymen's Society,* Preprint 52-42, 1952, 15 pages.

Incidence of scabbing was studied by means of test castings, and results are correlated with certain physical properties of the sand. A variety of sand compositions was evaluated. 13 ref. (E18)

306-E. Melting Iron in a Basic-Lined Water-Cooled Cupola. Wally Levi. *American Foundrymen's Society,* Preprint 52-48, 1952, 14 pages.

Development of experimental procedure and equipment, including basic cupola design. Results of several heats are tabulated. (E10, CI)

307-E. Use of Aluminum Bronze in High Pressure Castings. Thornton C. Bunch and George E. Dalbey. *American Foundrymen's Society,* Preprint 52-54, 1952, 6 pages.

Possibility of substituting Al bronze castings for brass forgings and for gunmetal in certain high-pressure heavy castings. Solidification properties. Radiographs, micrographs, macrographs, and photographs. (E25, Cu)

308-E. Effects of Mold Materials on Leak Tightness and Mechanical Properties of 85-5-5-5 and 81-3-7-9 Alloy Castings. J. G. Kura and L. W. Eastwood. *American Foundrymen's Society,* Preprint 52-55, 1952, 15 pages.

Extensive tabular and graphical data. Micrographs and radiographs. (E19, Q general, Cu)

309-E. Flowability of Foundry Sand. Loris M. Diran, Amos J. Shaler, and Howard F. Taylor. *American Foundrymen's Society,* Preprint 52-60, 1952, 15 pages.

Analyzes concepts of "flowability" and "moldability" of sands. Results of grid analyses show that flow of molding sands under pressure is the result of two different mechanisms: during deformation and in later stages. Flow depends upon type of bond used, shape of the sand grains, and method of loading. Composition effects were also determined. Tables, graphs, photographs, and diagrams. (E18)

310-E. Application of Chills to Increasing the Feeding Range of Risers. E. T. Myskowski, H. F. Bishop, and W. S. Pellini. *American Foundrymen's Society,* Preprint 52-66, 1952, 11 pages.

The length of steel plate and bar castings which can be made sound when directional solidification is aided by use of adequate steel chills was determined radiographically and related to thermal gradient conditions in both the casting and chill. Similar studies with high-conductivity Cu and water-cooled chills

show that the added improvement in soundness obtainable by such chills is negligible. Basic effects of chill behavior as related to heat flow and solidification mode. Graphs, tables, diagrams, and radiographs. (E25, E22, ST, Cu)

311-E. Effects of Gating Practice on Leak Tightness of 85-5-5-5 and 81-3-7-9 Alloy Castings. J. G. Kura and L. W. Eastwood. *American Foundrymen's Society,* Preprint 52-67, 1952, 9 pages.

Effects of pouring temperature and melting practice were also determined, and relative susceptibilities of the two alloys to leakage were compared. Diagrams, graphs, tables, and radiographs. (E22, E23, Cu)

312-E. A Study of the Formation of Nodular Graphite. Fredrik Hurum. *American Foundrymen's Society,* Preprint 52-75, 1952, 14 pages.

Various grades of pig iron were remelted in an induction furnace. Sillimanite crucibles were used and the charges varied from 2 to 6 lb. Different methods were used to add Mg and ferrosilicon to the melt. Telescopic test pieces having diameters of 5, 10, 20, and 40 mm. and test bars of 20-mm. diam. were cast in graphite and core-sand molds. Several melts of synthetic cast iron were also made and treated in various ways. Micrographs and diagrams. 11 ref. (E25, CI)

313-E. Metallurgical Blast Cupola. R. Doat and M. A. DeBeck. *American Foundrymen's Society,* Preprint 52-76, 1952, 8 pages.

Cupola developed and operated at Liege, Belgium, for production of good-quality gray iron for pipe spinning, from charges consisting of 90 and even 100% mild steel scrap. The setup resembles a combination small blast furnace, slagging gas producer and cupola. Detailed operating data and advantages. 12 ref. (E10, CI)

314-E. Patterns for High Production Malleable and Steel Foundries. Joseph M. Kreiner. *American Foundrymen's Society,* Preprint 52-77, 1952, 4 pages.

Design, construction, and standardization of pattern and corebox equipment. Patterns are constructed on interchangeable basis. The castings must interchange in an assembly with castings made in eight different foundries. Diagrams. (E17, CI)

315-E. Light Alloy Production. *Automobile Engineer,* v. 42, Apr. 1952, p. 141-142.

Important developments by High Duty Alloys Ltd., in completely new foundry, specifically laid out for pressure die casting. (E13)

316-E. Sand Casting With Croning Process Shell Molds. Richard Herold. *Canadian Metals,* v. 15, Apr. 21, 1952, p. 30-32, 34-35.

Advantages of shell molding which is now used for automobile parts, railroad castings, electrical fittings, radiation and boiler sections, diesel castings, aviation castings, marine castings, plumbing fittings, hand tools, pressure pipe, home utility items, kitchen equipment, water pumps, and fractional-horsepower electric-motor housings. It is particularly well-suited to Al; gray, nodular and malleable Fe; low-lead low-tin bronzes, and high alloy steels. (E16, Al, CI, AY)

317-E. Melting Cast-Iron Borings in Foundry Cupola. *Engineering,* v. 173, Apr. 11, 1952, p. 459-460.

About 15% of the initial weight of an iron casting is removed during machining operations and, very often, a high proportion of the borings or swarf produced is lost because of the difficulty of melting this material economically and satisfactorily. Process in which the swarf is fed directly into the cupola at a point well below the normal charging level and just above the melting zone, where the downcoming coke, limestone and solid metal of the charge prevent the borings from being ejected from the cupola. (E10, CI)

318-E. Melting Cast Iron Swarf in Cupolas. *Engineer,* v. 93, Apr. 11, 1952, p. 503.

See abstract of "Melting Cast Iron Borings in Foundry Cupolas." *Engineering,* item 317-E, 1952. (E10, CI)

319-E. Magnesium Sand Foundry Technology. W. C. Newhams. *Foundry,* v. 80, May 1952, p. 144-149, 362, 364, 366.

Developments in the industry since World War II. Recommendations on melting, molding, gating and risering, and correction of defects. (E18, Mg)

320-E. Operating a Basic Cupola. Sam F. Carter. *Foundry,* v. 80, May 1952, p. 150-153, 250, 252, 254, 256, 259-260.

Experience in commercial operation of a basic-lined cupola. Advantages and disadvantages compared with acid practice, and properties of the metal produced. Tabular data on comparative refractory performance and patching costs,

basic mixes with varying slag basicity, special irons made in basic cupola, and properties in various diameter bars (E10, Fe)

321-E. Versatile Coreboxes. Richard H. Harwell and J. H. Schaum. *Foundry,* v. 80, May 1952, p. 154-155, 342.

A set of 14 coreboxes for cylindrical cores was made of wood. They are applicable to a variety of jobs. In many instances, metal may prove to be a more satisfactory material. Design of the boxes. (E21)

322-E. The Nonferrous Cleaning Room. Martin G. Dietl. *Foundry,* v. 80, May 1952, p. 156-159, 276, 278, 280, 284, 286.

Finishing the brass or bronze casting after it has solidified in the mold. (E24, Cu)

323-E. Good Casting Design Can Help Foundry Operations. J. W. Bryant. *Foundry,* v 80, May 1952, p 224, 226.

Problems facing the mechanical designer with respect to economizing on weight and size of castings. (E general)

324-E. How to Mold A Large Aluminum Ring Casting. Frederick H. Palmer. *Foundry,* v. 80, May 1952, p. 262, 266.

(E19, Al)

325-E. Swarf Injector for Cupolas. A. R. Parkes. *Foundry Trade Journal,* v. 92, Apr. 10, 1952, p. 389-392.

Equipment and process developed by Crofts (Engineers), Ltd., Bradford, England. (E10, CI)

326-E. Foundry Mechanization. *Foundry Trade Journal,* v. 92, Apr. 17, 1952, p. 415-416.

Discussion of paper published in *Canadian Metals.* See item 239-E, 1952. (E general)

327-E. Dust Problems in Foundries. *Foundry Trade Journal,* v. 92, Apr. 10, 1952, p. 379-384; Apr. 17, 1952, p. 421-423.

A general discussion by several members at a meeting of Institute of British Foundrymen. (E general, A7)

328-E. A Technique for Eliminating Crucibles in Heating and Melting of Metals. D. M. Wroughton, E. C. Okress, P. H. Brace, G. Comenetz, and J. C. R. Kelly. *Journal of the Electrochemical Society,* v. 99, May 1952, p. 205-211.

Method of heating and melting metals without a crucible, by suspension in space with an electromagnetic field. The required field was generated by applying high frequency a.c. to two coaxial coils connected in series opposition. Stable levitation and heating of various metals in the solid state was obtained between the coils in the vicinity of the common axis, both in air and in a vacuum. Diagrams and photographs. (E10)

329-E. Magnesium Die Casting Is Backbone of Expanding Operation. Gilbert C. Close. *Light Metal Age,* v. 10, Apr. 1952, p. 12-14, 16.

Process for light-weight, engine-driven tools manufactured by McCulloch Motors Corp., Los Angeles. Main products include chain saws, posthole diggers, centrifugal pump, military-target airplane engines, and a new twin-rotor helicopter. (E13, Mg)

330-E. Bibliography of the Die Casting Process. Part VI. (Concluded). Harold Bourassa. *Light Metal Age,* v. 10, Apr. 1952, p. 28.

(E13)

331-E. The Shell Molding Process: Advantages; Recent Technical Progress; Outlook. F. L. Church. *Modern Metals,* v. 8, Apr. 1952, p. 28-30, 32-33.

(E16)

332-E. Thermal Considerations in Foundrywork. Victor Paschkis. *Proceedings of the Institute of British Foundrymen,* v. 44, 1951, p. A32-A46; disc., p. A46-A59.

Previously abstracted from *Institute of British Foundrymen.* See item 395-E, 1951. (E25)

333-E. Synthetic Resin Core Binders; Report and Recommendations of Sub-Committee T.S.30 of the Technical Council. G. L. Harbach, chairman. *Proceedings of the Institute of British Foundrymen,* v. 44, 1951, p. A100-A107; disc., p. A107-A112.

Correlates findings resulting from circulation of a questionnaire to a number of foundries. (E18)

334-E. Some Present-Day Practices in Patternmaking. B. Levy. *Proceedings of the Institute of British Foundrymen,* v. 44, 1951, p. A113-A120; disc., p. A120-A124.

Previously abstracted from *Institute of British Foundrymen;* item 369-E, 1951. (E17)

335-E. Production of Heavy Castings for Electrical Generating Equipment. N. Charlton. *Proceedings of the Institute of British Foundrymen,* v. 44, 1951, p. A125-A133; disc., p. A133-A136.

Previously abstracted from *Institute of British Foundrymen;* item 356-E, 1951. (E11, CI)

336-E. Manufacture of Propellers and Other Castings. C. W. Stewart. *Proceedings of the Institute of British Foundrymen,* v. 44, 1951, p. A137-A144; disc., p. A144-A146.

Previously abstracted from *Institute of British Foundrymen;* item 370-E, 1951. (E11, CI)

337-E. Casting Characteristics of Some Aluminium Alloys. D. C. G. Lees. *Proceedings of the Institute of British Foundrymen,* v. 44, 1951, p. A170-A182; disc., p. A190-A197.

Previously abstracted from *Institute of British Foundrymen,* item 396-E, 1951. (E25, Al)

338-E. The Hot Blast Cupola. (In Swedish.) Morris Itzel. *Gjuteriet,* v. 42, Mar. 1952, p. 35-42.

Briefly discusses theory. Advantages and disadvantages of the process in comparison with ordinary cold-blast practice. Reviews the most common designs at present in use for preheating the blast. Diagrams. 19 ref. (E10)

339-E. Reduction of Dust in Steelfoundry Operations. W. A. Bloor. *Proceedings of the Institute of British Foundrymen,* v. 44, 1951, p. A222-A232; disc., p. A254-A262.

Methods, including sampling and analysis apparatus and procedures. Reviews work of BISRA.
(E general, A7)

340-E. Observation and Control of Dust in Foundry Dressing Operations. Part I. Control of Dust. R. F. Ottignon. **Part II. Observation of Dust.** W. B. Lawrie. *Proceedings of the Institute of British Foundrymen,* v. 44, 1951, p. A233-A253; disc., p. A254-A262.

Previously abstracted from *Institute of British Foundrymen;* item 427-E. 1951. (E24)

341-E. Mechanical Charging of Cupolas; Survey of Methods in Use and Principles Involved. W. J. Driscoll. *Proceedings of the Institute of British Foundrymen,* v. 44, 1951, p. A263-A287; disc., p. A287-A291.

Previously abstracted from *Institute of British Foundrymen;* item 428-E, 1951. (E10, CI)

342-E. Loam and Dry-Sand Moulding in the Jobbing Foundry. D. Redfern. *Proceedings of the Institute of British Foundrymen,* v. 44, 1951, p. B1-B8; disc., p. B8-B12.

Procedures and equipment of a typical heavy jobbing shop, where castings ranging from 2 to 40 tons are produced. (E19, CI)

343-E. Chilled-Roll Manufacture. K. H. Wright. *Proceedings of the Institute of British Foundrymen,* v. 44, 1951, p. B13-B28; disc., p. B28-B30.

Previously abstracted from *Foundry Trade Journal;* item 88-E, 1951. (E11, T5, CI)

344-E. Core-Blower Application and Operation. G. W. Fearfield. *Proceedings of the Institute of British Foundrymen,* v. 44, 1951, p. B31-B38; disc., p. B38-B39.

Previously abstracted from *Foundry Trade Journal;* item 193-E, 1951. (E21)

345-E. Intricate Castings From a Durable Loam Mould. J. Currie. *Proceedings of the Institute of British Foundrymen,* v. 44, 1951, p. B50-B62.

Previously abstracted from *Foundry Trade Journal;* item 296-E, 1951. (E19, CI)

346-E. Practical Experiences in Producing Nodular Cast Iron. M. M. Hallett. *Proceedings of the Institute of British Foundrymen,* v. 44, 1951, p. B63-B70; disc., p. B70-B73.

Previously abstracted from *Foundry Trade Journal;* item 60-E, 1951. (E25, CI)

347-E. Loam Moulding of Pump Castings and Impellers. E. Clipson. *Proceedings of the Institute of British Foundrymen,* v. 44, 1951, p. B74-B83; disc., p. B83-B84.

Previously abstracted from *Foundry Trade Journal;* item 341-E, 1951. (E11, CI)

348-E. Notes on Cast Iron—Past and Present. E. Longden. *Proceedings of the Institute of British Foundrymen,* v. 44, 1951, p. B85-B101; disc., p. B101.

Previously abstracted from *Foundry Trade Journal;* item 325-E, 1951. (E25, CI)

349-E. Moulding and Testing Non-Ferrous Hydraulic Castings. W. Thomson. *Proceedings of the Institute of British Foundrymen,* v. 44, 1951, p. B102-B109.

Investigation of various types of test bars and experiments with a "hydraulic" mixture. Specimens are bronzes and Al alloys.
(E19, Q general, Cu, Al)

350-E. Straight Cast-Iron Pipes. J. L. Handley. *Proceedings of the Institute of British Foundrymen,* v. 44, 1951, p. B124-B129.

Previously abstracted from *Foundry Trade Journal;* item 201-E, 1951. Mar. 15, 1951, p. 275-280. (E11, CI)

351-E. Large Light-Alloy Castings. (In French and German.) J. P. Meister. *Aluminum Suisse,* v. 2, Mar. 1952, p. 67.

(E general, Al)

352-E. The Preparation of Cement Forming Sands. (In German.) H. Gries. *Giesserei,* v. 39, Mar. 20, 1952, p. 121-127.

Applicability of synthetic sands in sand casting, as well as economic significance of re-use of old sands. Various types of sand compositions, and their resistance to pressure and

their gas permeability. Methods of preparation of new and used sands. Data are tabulated and charted. 12 ref. (E18)

353-E. Gypsum as a Material for Matchplate Preparation. (In German.) K. Schroder. *Giesserei,* v. 39, Mar. 20, 1952, p. 127-130.

Physical properties are charted and discussed. Applicability for above use. (E17)

354-E. Aluminum Castings for Polished and Anodized Parts, Particularly for Metal Fittings. (In German.) Marie Buckeley-Liesegang and August Buckeley. *Metalloberfläche,* v. 6, sec. A, Mar. 1952, p. A33-A41.

Correct application for cast Al alloys. A series of casting defects and their causes; possibilities for eliminating them. Little known surface treatments for metal fittings are suggested. (E25, L general, Al)

355-E. Casting Steel Spokes In Large Iron Wheels. Pat Dwyer. *Foundry,* v. 80, May 1952, p. 291-292.

Practice in American foundries where wheels of various kinds with cast iron rims and hubs, and steel spokes, are cast. (E11, CI)

356-E. Recent Development of Cupola Design With Special Reference to Hot-Blast. Fritz Schulte. *Foundry Trade Journal,* v. 92, Apr. 17, 1952, p. 405-414; Apr. 24, 1952, p. 443-444; disc., p. 444-447.

Survey of performance figures, recently published, for some 500 German cupolas. Effect of blast preheating on theoretical combustion temperature and coke consumption. Various types of recuperators, and the special advantages of combining a single, water-cooled cupola with the recuperator. Considers oxygen addition, and also combining the cupola with a low-frequency induction furnace. (E10)

357-E. Electric Furnace Melting For Steel Castings. John Howe Hall. *Foundry,* v. 80, May 1952, p. 160-161, 318, 320, 322, 327.

Procedure in electric furnace operation. Includes application of the lining, and charging and melting methods. (To be continued.) (E10, ST)

358-E. Effect of Raw Materials on Cupola Operation. Bernard P. Mulcahy. *Foundry,* v. 80, May 1952, p. 242, 244.

How different types, shapes, and qualities of scrap affect cupola operations. (To be continued.) (E10, CI)

359-E. Magnesium Die-Casting in a Pacific Coast Shop. Gilbert C. Close. *Machinery* (American), v. 58, May 1952, p. 148-151.

See abstract of "Magnesium Die Casting is Backbone of Expanding Operation", *Light Metal Age,* item 329-E, 1952. (E13, Mg)

360-E. The Peco 10-C Die Casting Machine. H. K. Barton. *Machinery* (London), v. 80, Apr. 24, 1952, p. 728-734.

Built by the Projectile and Engineering Co., Ltd., London, and intended for production of large castings in the higher melting point alloys. As much as 8½ lb. of Al can be handled at one shot. (E13)

361-E. A Note on the Mechanism of Solidification of Horizontal Sand Castings. K. C. Adamson and J. B. Sayers. *Metallurgia,* v. 45, Apr. 1952, p. 163-168.

Process was studied in Al and Al-Zn alloys by temperature measurements, pour-out tests, and examination of macrostructures. Concludes that macrostructure of the type of casting examined is mainly dependent on difference in specific gravity between primary crystallites and liquid melt. Table, graphs, and photographs. 23 ref. (E25, Al)

362-E. Tackling the Pig Iron Shortage: New Method of Charging Borings Into the Cupola. *Metallurgia,* v. 45, Apr. 1952, p. 199-200.

Equipment made by Crofts (Engineers), Ltd., Bradford, England, which feeds borings into the spaces between metal and coke directly above the melting zone. (E10, Fe)

363-E. A Die Casting Replaces a 2-Piece Assembly and Cuts Costs by 76 Per Cent. *Precision Metal Molding,* v. 10, May 1952, p. 25.

Al die-cast wheel bushing used by Durant Mfg. Co., Milwaukee, in their cycle counters. Shows a manufacturing economy and a 50% inventory reduction. (E13, T7, Al)

364-E. Folding Cantilever Arm Assembled From Permanent Mold Castings. *Precision Metal Molding,* v. 10, May 1952, p. 30-32.

Advantages of Al permanent-mold castings. Refers to dental equipment made by Ritter Co., Rochester, N. Y. Copper conduit is also cast in as inserts. (E12, T10, Al, Cu)

365-E. Materials and Methods Currently in Use as Lubricants for Die Casting Dies. *Precision Metal Molding,* v. 10, Mar. 1952, p. 77-81.

(To be continued.) (E13)

366-E. Possibility of Use of Light-Alloy Shell Molds. (In French.) *Fonderie,* Mar. 1952, p. 2851-2857.

Economic problems involved in gravity casting of light-alloy molds. Diagrams and photographs. (E11, Al)

367-E. Green Sand Casting of Bronze. (In French.) *Fonderie,* Mar. 1952, p. 2858-2865.

Experiments were made to determine the effects of abnormally high moisture contents and pressures. Diagrams, tables, and photographs. (E11, Cu)

368-E. High-Frequency Baking of Foundry Cores by Capacitance Heating. (In German.) H. Derlong and C. Rauh. *Giesserei,* v. 39, Apr. 17, 1952, p. 179-181.

Method of baking cores with synthetic binders. Physical fundamentals of high-frequency baking. Effect of plate distance and drying time. Water content of the cores. Combinations of baking by high-frequency and infrared radiation. Trials with oil cores. Tables and graphs. (E21)

369-E. (Book) **Manufacturing Processes.** Ed. 2. Myron L. Begeman. 608 pages. John Wiley and Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $6.00.

Foundry practice, pattern work, plastic molding, powder metallurgy, hot and cold working of metals, heat treatment and welding, measuring instruments, cutting tools, machines, and their accessories. (E general, G general, H general, J general, K general)

370-E. Ways and Means to Increased Productivity. John Hunter. *Foundry Trade Journal,* v. 92, May 1, 1952, p. 457-462.

General factors affecting productivity in the foundry industry. Major influences and means for improvement. Patterns, molding boxes, manual effort, roller-track, overhead hoppers, sandslingers, and rubbish disposal. Interrelation with plant utilization. Tables, graphs, and diagrams. (E general, A5)

371-E. Job Foundry Tackles Shell Mold Production. G. Palmer Derby. *Iron Age,* v. 169, May 15, 1952, p. 109-113.

Shell-mold castings of gray and ductile iron were successfully produced in a pilot-plant operation at Lynchburg Foundry Co., Lynchburg, Va. Two men handle all operations on the four-station machine used to produce the molds. (E16, CI)

372-E. Core Maker Uses Ultramodern Controls. Leon F. Miller. *Iron Age,* v. 169, May 15, 1952, p. 114-117.

Automatic electric timers, solenoid air valves, and air cylinders control the Osborn Mfg. Co.'s core-making machine. Operated by two men. Production of over 300 cores per hour has been recorded. Diagrams and photographs. (E21)

373-E. C. I. Swarf; Effective Use in the Cupola. *Iron & Steel,* v. 25, May 1952, p. 161-162.

Process developed by a British firm. (E10, CI)

374-E. Gas and Shrinkage Porosity in Castings. II. *Metal Industry,* v. 80, May 9, 1952, p. 389.

The conception of Whittenberger and Rhines that voids and pores are formed by a process of nucleation and growth during the freezing of castings. Confined to Mg and Mg-Al alloys. (E25, Mg, Al)

375-E. Casting Redesign May Result in Multiple Savings. *Steel,* v. 130, May 26, 1952, p. 78.

An example of foundry engineering methods where redesign of tractor drive spacer steel castings resulted in simplified production. (E11, CI)

376-E. Modern Electric Furnaces in Light-Alloy Foundries. (In French.) Raymond Guillemot. *Fonderie,* Apr. 1952, p. 2875-2883.

A review. Diagrams and illustrations. (E10, Al, Mg)

377-E. Influence of the Equilibrium Diagram on Shrinkage During Solidification. (In French.) Andre Tatur. *Fonderie,* Apr. 1952, p. 2884-2897.

Relationships between shrinkage during solidification, chemical composition, and period of solidification, as well as factors affecting pipe formation. Experiments conducted on pure Pb, Sn, Zn, Cd, and Bi; and on Pb-Sn, Zn-Cd, and Mg-Zn alloys. Graphs, tables, diagrams, and photographs. 28 ref. (E25, M24)

378-E. Choice of Lining for Cupolas; Mounting and Repairing Techniques. (In French.) *Fonderie,* Apr. 1952, p. 2903-2905. (E10)

379-E. Production From the Technical Point of View. (In French.) *Journal d'Informations techniques des Industrie de la Fonderie,* Jan. 1952, p. 5-8.

Production of oven doors so as to have tightness and good insulation, use of siphon-type brick in cupolas, and the use of talc sprinklers for tap holes in foundry furnaces. Includes schematic drawings. (E10)

380-E. Desulfurization of Pig Iron. (In French.) André Guédras. *Métallurgie et la Construction méchanique,* v. 84, Mar. 1952, p. 221, 223.

Different kinds of special coke used for cupola melting. (E10, CI)

381-E. Crucible Induction Furnaces for Operation on Power-Line Frequencies. (In German.) R. Lethen. *Giesserei,* v. 39, Apr. 3, 1952, p. 145-152.

Development of above furnaces for melting metals. Tables, graphs, diagrams, and photographs. (E10)

382-E. Cement-Bonded Molding Sand. C. D. Galloway. *American Foundryman,* v. 21, May 1952, p. 67-69.

Some of the studies and experiences of a cast iron foundry in making the change from dry sand to cement. (E18, CI)

383-E. Brass Foundry Mechanization. *American Foundryman,* v. 21, May 1952, p. 74-77.

Moccasin Bushing Co., Chattanooga, Tenn., illustrates progressive mechanization of a small bronze foundry. (E general, Cu)

384-E. Making a Separate Oven for Drying Sand-Lined Ladles. C. C. Spencer. *American Foundryman,* v. 21, May 1952, p. 82.

Drying sand linings of pouring ladles formerly required 8-12 hr., thus tying up much-needed core-oven capacity. Building a separate unit for this job has cut the time required to 3-4 hr., and provides an adequate supply of thoroughly dried sand-lined ladles without disrupting production in any department of Electric Steel Castings Co., Indianapolis. (E23)

385-E. Effects of Annealing on the Removal of Burned-On Sand. Donald Alverson. *American Foundryman,* v. 21, May 1952, p. 91-92.

Explanation, in terms of physical rather than chemical changes, is supported by micrographic studies of two cast iron test castings taken from normal production runs. (E24, J23, CI)

386-E. Redesigned for Gray Iron Casting Production. *American Foundryman,* v. 21, May 1952, p. 94-95.

Contest winners in Gray Iron Founders' Society Redesign Contest: Cast iron crankshaft substituted for forged steel in 8-cylinder diesel engine; cast iron mold-conveyor yoke; and outboard bearing stand for a large engine. (E11, CI)

387-E. Shell Mold Casting Method Invades Automotive Field. James R. Custer. *Automotive Industries,* v. 106, June 1, 1952, p. 42-43.

Production of some parts is already under way and experimental work is being conducted by numerous companies. Automatic shell-making machines demonstrated publicly for first time at foundry exposition. (E16)

388-E. Melting Aluminum-Base Alloys. L. W. Eastwood. *Canadian Metals,* v. 15, May 1952, p. 40, 42-43.

Charging and melting, preparation of remelting ingots and effect of temperature and holding time on Al alloys. (E10, Al)

389-E. Modern Pressure Die Casting Foundry. *Canadian Metals,* v. 15, May 1952, p. 44-45.

Previously abstracted from *Metallurgia;* item 284-E, 1952. (E13)

390-E. The Shell Molding Process. Its Mechanics and Applications. Bernard N. Ames, Seymour B. Donner, and Noah A. Kahn. *Foundry,* v. 80, June 1952, p. 112-117, 287-295.

See abstract of "Metallurgy of Shell Molding", *American Foundryman;* item 128-E, 1952. (E16)

391-E. Casting Brake Drums at the Budd Co. Foundry. John Howe Hall. *Foundry,* v. 80, June 1952, p. 118-122.

New plant in Philadelphia which produces up to 4000 gray iron castings per 8-hr. shift, yet employs only 50 men. (E11, CI)

392-E. Mechanizing for Increased Production. Erle F. Ross. *Foundry,* v. 80, June 1952, p. 124-127, 253-254.

Adaptable molding system installed in the Al foundry of Waukesha Foundry Co., Waukesha, Wis. (E19, Al)

393-E. Casting the Superalloys. Thomas A. Dickinson. *Foundry,* v. 80, June 1952, p. 255-256.

Brief discussion for some typical superalloys including a metal-ceramic. Table gives some physical, mechanical, and corrosion-resistant properties.
(E general, P general, Q general, R general, SS, SG-h)

394-E. Production of Castings in Aluminium-Bronze, D. T. D. 412. L. Hargreaves. *Foundry Trade Journal,* v. 92, May 8, 1952, p. 487-489.

Experimental development of procedure. (E general, Cu)

395-E. Some Casting Problems of Copper-Lead Alloys. P. D. Liddiard and P. G. Forrester. *Foundry Trade Journal,* v. 92, May 15, 1952, p. 509-515; May 22, 1952, disc., p. 541-545.

Casting of Cu-Pb alloys as linings onto steel shells has many problems, some not common to the casting of solid bodies. Theoretical aspects, such as equilibrium diagram of the system, effect on it of other elements, etc. Problems anticipated, and practical methods being used to produce these linings by casting. Methods used in Great Britain, in the United States and on the Continent are critically reviewed and compared. Static, centrifugal, and continuous processes. 10 ref.
(E general, M24, Cu, Pb, SG-c)

396-E. Synthetic Resins in the John Harper Foundry. J. W. Dews and P. H. Drury. *Foundry Trade Journal,* v. 92, May 22, 1952, p. 535-539, 550.

Experiences in the development of a urea-formaldehyde liquid-resin core binder in preparation for large-scale operation. Tables and photographs. (E18)

397-E. Note on the Deoxidation of Brasses. *Foundry Trade Journal,* v. 92, May 22, 1952, p. 549.

Previously abstracted from *Fonderie,* item 269-E, 1952. (E25, Cu)

398-E. Small Plants Favor Induction Furnaces. Lewis B. Reed. *Iron Age,* v. 169, May 29, 1952, p. 79-81.

Small plants in the Los Angeles area have found electric induction furnaces more suited to their needs than gas furnaces—despite higher melting costs of the former. Lower maintenance costs, silicon dispersion without labor, and better temperature control are cited. Also in favor are the lack of noxious and sulfurous fumes, lowered operator fatigue, and lack of heat, open flames, and fire hazards. Induction furnaces permit high metal recovery. (E10)

399-E. Good Design Can Cut Die Casting Costs. W. M. Halliday. *Iron Age,* v. 169, June 5, 1952, p. 138-141.

See abstract of "Designing Components for Die-Casting", *Foundry Trade Journal,* item 158-E, 1952. (E13, Sn, Pb, Zn, Al, Mg, Cu)

400-E. Studies of Gases Evolved on Solidification of Molten Cast Iron. III. On the Effect of Humidity. (In English.) Minao Otsuka. *Japan Science Review,* v. 2, Aug. 1951, p. 197-202.

Variation of percentage of foundry scrap between the dry and rainy seasons was studied. Cast irons were melted on days of high and low humidities in an electric furnace and a 1-ton cupola, and the gases evolved on solidification were collected and analyzed. Experiments were made to determine whether H_2 from iron hydroxide penetrates into molten Fe or not. Also moist air of various humidities produced by bubbling or by steam, was blown onto molten iron surfaces, the slag being removed before and during blowing. Evolved gases were analyzed. (E25, CI)

401-E. Some Experiments With Ductile Cast Iron. C. C. Hodgson and C. S. Johnson. *Metallurgia,* v. 45, May 1952, p. 218-224.

An investigation to enable comparison with blackheart malleable cast iron. Production of the iron on a laboratory and plant scale; influence of raw materials on the response to nodulization, and relationship between chemical composition and mechanical properties of annealed ductile cast iron; full-scale foundry tests; and machining tests. Tables, micrographs, and graphs. (E25, Q general, G17, CI)

402-E. Modern Foundry Practice. T. W. Bushell. *North East Coast Institution of Engineers & Shipbuilders, Transactions,* v. 68, Apr. 1952, p. 277-312.

Recent history; making of the "perfect casting"; a new general foundry department; problems and heat treatment in steel castings production; testing and inspection methods; and tables of chemical composition and mechanical properties. Radiographs and micrographs. (E general, CI)

403-E. How Intaglio Lettering and Design Are Die Cast Without Retracting Slides or Loose Cores. W. M. Halliday. *Precision Metal Molding,* v. 10, June 1952, p. 28-29, 78-83.

British procedure. Detailed drawings. (E13)

404-E. New Process Reclaims Borings. *Steel,* v. 130, June 2, 1952, p. 97-98.

British development for melting and feeding cast-iron borings or swarf to the cupola. (E10, A8, CI)

405-E. Shell Molding by the Croning Process. Richard Herold. *Tool Engineer,* v. 28, June 1952, p. 53-56.

See abstract of "Sand Castings With Croning Process Shell Molds", *Canadian Metals;* item 316-E, 1952. (E16, Al, CI, AY)

406-E. Nodular Cast Iron. (In Swedish.) Lars Barrling. *Gjuteriet,* v. 42, Apr. 1952, p. 55-61; disc., p. 61-62.

Experiments at SKF, Katrineholm, on producing nodular cast iron on an industrial scale. Relationship between structure of cast iron and mechanical properties, and different methods of making nodular cast iron. At SKF, nodular cast iron is made by adding approximately 1.5% of a Ni-Mg alloy containing 15% Mg to the melt at 1400-1450° C. The melt is then inoculated with 75% ferrosilicon so that the silicon content is increased by 0.5-0.1%. (E25, CI)

407-E. Effect of Raw Materials on Cupola Operation. Bernard P. Mulcahy. *Foundry,* v. 80, June 1952, p. 284, 286.

Effective sorting of poorly graded scrap and the handling of borings in making up cupola charges. (To be continued.) (E10)

408-E. Electromagnetic Levitation of Solid and Molten Metals. E. C. Okress and D. M. Wroughton. *Journal of Applied Physics,* v. 23, May 1952, p. 545-552.

An unconventional method of heating and melting metals with-

out a crucible, by suspension in space with an electromagnetic field. Operating conditions and material for high-melting point metals thus avoiding difficulties of container preliminary results with various forms and masses of metal. Considerations concerning the atmosphere in which levitation occurs. Graphs, diagrams, and photographs. (E10, EG-d)

409-E. (Book) **Hochwertiges Gusseisen (Grauguss) seine Eigenshaften und die physikalische Metallurgie seiner Herstellung.** (High-Strength Cast Iron (Gray Iron) Its Properties and Physical Metallurgy of Its Production. Ed. 2. Eugen Piwowarsky. 1070 pages. 1951. Springer-Verlag, Berlin, Germany.

The structure, properties, production, testing, and uses of unalloyed and alloyed cast irons. Effects of gaseous and solid elements and of thermal and mechanical treatments on the properties of cast irons. Tables, graphs, diagrams, photographs, micrographs, and numerous references. (E general, CI)

410-E. Standardizing Casting Practice. A. S. Grot and L. H. Carr. *American Foundryman,* v. 21, June 1952, p. 42-48.

Successful control program of Edwards Valves, Inc., in connection with manufacture of steel valves for high-pressure service throughout a wide temperature range. Diagrams, macrographs, and photographs. (E11, CI)

411-E. Lighting the Standard Cupola Without Causing Smoke. C. F. Semrau. *American Foundryman,* v. 21, June 1952, p. 49.

Text and diagrams show recommended procedure. (E10)

412-E. Fool-Proof Sand Works for Wide Range of Castings. J. S. Schumacher. *American Foundryman,* v. 21, June 1952, p. 54-57.

Composition and characteristics of a foundry sand applicable to a wide range of casting sections. Graphs and tables. (E18)

413-E. Basic Refractories For Cupola Service. M. W. Demler. *American Foundrymen's Society,* Preprint 52-20, 1952, 4 pages.

Refractories used for acid practice as compared with those required for basic practice. Application of basic refractories for cupola linings. (E10)

414-E. Report of Committee B-6 on Die-Cast Metals and Alloys. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 167-193; disc., 193-197.

Previously abstracted from Preprint 11, item 359-E, 1951. (E13, Al)

415-E. Report of Committee B-6 on Die-Cast Metals and Alloys. *American Society for Testing Materials,* Preprint 12, 1952, 7 pages.

Recommendations for changes in standards and specifications and discussion of paper by W. Babington and D. H. Kleppinger on Al die castings (*American Society for Testing Materials, Proceedings,* item 359-E, 1951). (E13, Al)

416-E. An Exothermic Feeding Compound: Its Use With Steel Castings. E. Lazendorfer. *Iron & Steel,* v. 25, June 1952, p. 283-288.

Experiences with a British material, Feedex, with the outstanding feature of being moldable and capable of fabrication into any desired shape. Gives marked reduction in riser size. Examples cover an unspecified steel, 12-14% Mn steel, high alloy Cr-Ni steel, and Mn bronze. Photographs, graphs, and micrographs. (E25, ST, CI, SS, Cu)

417-E. New Die Caster for Aluminum, Zinc, or Copper Alloys. *Light Metals,* v. 15, June 1952, p. 196.

Machine which will cast Al, Zn or Cu alloys without the necessity of a major conversion. Other advantages. Chart of working data. (E13, Al, Zn, Cu)

418-E. Designing With Ductile Iron. John L. Goheen. *Machine Design,* v. 24, June 1952, p. 161-166.

Survey of the characteristics of ductile iron with pertinent information on important design considerations. Foundry practice. Charts, photographs, photomicrographs, and a table of mechanical, physical and machining properties. (E general, P general, Q general, G17, CI)

419-E. Reduction of Development Costs in Die Casting. H. K. Barton. *Machinery* (London), v. 80, May 29, 1952, p. 942-950.

Recommended procedures. Includes list of questions to be checked, and diagrams. (E13)

420-E. Sealing Porous Castings by Vacuum Impregnation. *Machinery* (London), v. 80, May 29, 1952, p. 959-960.

Application to phosphor bronze casings of impeller-type water pumps for fire engines, by a British firm. (E25, Cu)

421-E. Basic Lining for Cupolas. *Metal Progress,* v. 67, June 1952, p. 91.

Advantages and disadvantages.

Experiences of American Cast Iron Pipe Co., Birmingham, Ala. (E10, CI)

422-E. Casting Revolution Picks Up Speed. *Modern Industry,* v. 23, June 15, 1952, p. 107-108, 110.

Shell molding, the new casting process that uses a resin-bonded sand shell in place of a rammed-sand flask. Process applicable to gray iron, stainless steel, bronze, Al, and Mg. (E16, CI, SS, Cu, Al, Mg)

423-E. Steel Foundry Refractories. R. Groves. *Refractories Journal,* May 1952, p. 209-213.

The three main types. (E general, ST)

424-E. (French.) **Experimental Study on the Efficiency of Recirculation in Foundry Furnaces. Part One.** M. Georges Ulmer. *Fonderie,* May 1952, p. 2917-2926.

Experiments on an industrial scale. Experimental arrangement. Results and their interpretation. Tables, charts, diagrams, and photographs. (To be continued.) (E10)

425-E. (French.) **Fluidity of Binary Sn-Zn and Al-Zn Alloys.** V. Kondic and T. P. Yao. *Revue de Métallurgie,* v. 49, May 1952, p. 321-326; disc., p. 326-327.

Fluidity experiments using mostly the eutectic compositions. Experimental arrangement and results. Diagrams, graphs, and micrographs. (E25, Sn, Al, Zn)

426-E. Large Parts, Intricate Shapes, Difficult Metals, Are Possible With Skilled Investment Casting. D. F. B. Tedds. *American Machinist,* July 7, 1952, v. 96, p. 141-146.

Diagrams and illustrations show details of varied applications. (E15)

427-E. Used Moulding Sand Reclaimed by Air Scrubbing. H. H. Fairfield, James McConachie, and H. F. Graham. *Canadian Metals,* v. 15, June 1952, p. 36, 38-40.

Process at William Kennedy & Sons, Ltd., Owen Sound, Ont. Properties of the reclaimed sand. Tables and layout diagram. (E18)

428-E. Grain Size and Permeability of Foundry Sands. Philippe Jasson. *Engineers' Digest,* v. 13, June 1952, p. 194. (Translated and condensed.)

Previously abstracted from *Fonderie.* See item 266-E. 1952. (E18)

429-E. Plastics Remold the Foundry. Francis Bello. *Fortune,* v. 46, July 1952, p. 104-107, 140, 143.

Current status of the shell-molding process. (E16)

430-E. Automatic Devices Facilitate British Foundry Operations. Vincent Delport. *Foundry,* v. 80, July 1952, p. 87-91.

Electrical units employed by Ferranti Ltd., of Great Britain, for automatically adding inoculant to cupola iron and for measuring the moisture content of molding sand. Photographs and circuit diagram. (E10)

431-E. Investments for the Precision Casting Process. William F. Davenport and Adolph Strott. *Foundry,* v. 80, July 1952, p. 92-93, 192, 194, 196.

A study of the feasibility of using less critical materials for investments in precision casting work indicates that low-priced foundry sands can be used as the refractory. Satisfactory results were obtained employing such binders as phosphate salts, plaster, and alumina-base cement. Tables. (E15)

432-E. Production of Aluminium-Nickel Bronze Sand Castings. Vincent De Pierre and Richard C. Wynne, *Foundry,* v. 80, July 1952, p. 94-97, 247-249.

Production practices employed at the U. S. Naval Gun Factory, Washington, for Al-Ni bronze sand castings. Properties of these castings. Diagrams, tables, and photographs. (E11, Cu)

433-E. Model Castings Developed for Huge Forging Press. *Foundry,* v. 80, July 1952, p. 98-99.

Production of Al model castings for very large forging presses at Alabama Polytechnic Institute. (E general, T5, Al)

434-E. Modernized Foundry Boosts Castings Output. Robert H. Herrmann. *Foundry,* v. 80, July 1952, p. 100-105, 216, 218.

How the Dodge Mfg. Corp., Mishawaka, Ind., manufacturer of power-transmission machinery, increased production 50% by rebuilding, redesigning, and mechanizing a section of its foundry. (E11)

435-E. Effect of Blacking Additions to Core and Molding Sands. Theodore H. Burke. *Foundry,* v. 80, July 1952, p. 110-111, 234-235.

Studies were conducted by the Worthington Corp., Buffalo, N. Y. to find a suitable but inexpensive material to incorporate in the core-sand mixture which would withstand the severe conditions imposed by the large volume of metal surrounding the cores. Tables, graphs, and photographs. (E18)

436-E. Current Status of the Shell Molding Process. Roy W. Tindula. *Foundry,* v. 80, July 1952, p. 201-202, 204, 206, 208, 210.

The present status of the proc-

ess including both technical procedures and patent implications. The information was released by the U. S. Dept. of Commerce and includes a discussion of the major developments in shell molding. 36 ref. (E16)

437-E. Effect of Raw Materials on Cupola Operation. Bernard P. Mulcahy. *Foundry,* v. 80, July 1952, p. 211-212, 214, 216, 218.

Precautions to observe in the use of steel scrap and foundry returns in the cupola metal charge. (E10, Fe, ST)

438-E. New Device Charges Loose Borings Into Cupola. *Foundry,* v. 80, July 1952, p. 220.

New method of reclaiming cast-iron borings in the cupola developed by Crofts (Engineers) Ltd., Bradford, England. (E10, CI)

439-E. Grain Refinement of Non-Ferrous Castings. G. Swinyard. *Foundry Trade Journal,* v. 92, June 19, 1952, p. 647-652.

Advantages and disadvantages of a fine-grained structure; estimation of grain refinement; theory of concentration gradients; and nucleation in the melt. Grain refinement of Al, Mg, and Cu and their alloys. 19 ref. (E25, Al, Mg, Cu)

440-E. Shell Molded Stainless Valves and Fittings Now in Production. G. F. Sullivan. *Iron Age,* v. 169, June 26, 1952, p. 112-116.

Shell molding at Cooper Alloy Foundry, Hillside, N. J. Increase in metal yield of 20-35% plus better tolerance, smoother finish, and cleaner working conditions are claimed. Types 304 and 316 stainless are used. (E16, SS)

441-E. An Investigation of the Gaseous Thermal-Decomposition Products of Linseed Oil. J. M. Horspool, K. A. R. Julian, and Graham Oldham. *Journal of Applied Chemistry,* v. 2, May 1952, p. 283-287.

Method developed for investigation of the above products of linseed oil when used as core binders. The method is suitable for similar investigations on other core-binding materials. Products of decomposition between 400 and 800° C. were investigated as well as effect of preliminary heat treatment of the core on composition of the gas. Tables and graphs. (E18)

442-E. The Trial and Development of Die Casting Dies. H. K. Barton. *Machinery* (London), v. 80, June 26, 1952, p. 1124-1132.

General development procedure; disposition of vents; local venting requirements; alterations to gates; control of cavity temperature; use of remote gates and blind runners; and establishing production time. (E13)

443-E. Sand-Cast Beryllium-Bronze. L. Grand. *Metal Industry,* v. 80, June 13, 1952, p. 481-484, 489.

Composition; casting technique; and effects of impurities; Al, Be content, increasing tempering temperature, mold material, and mold arrangement on mechanical properties. Photomicrographs, photographs, and tables. (E11, Q general, Cu, Be)

444-E. No Cure-All for Die Casters but Die Lubricants Smooth Performance. V. W. Smith. *Steel,* v. 130, June 30, 1952, p. 82, 84, 86.

The main purpose of the die lubricant—to prevent wear. Several specific lubricants. (E13)

445-E. (French) **Improvement in the Preparation of Gadolinium-Magnesium Alloys.** Francoise Gaume-Mahn. *Journal des Recherches du Centre National de la Recherche Scientifique,* Mar. 1952, p. 113-117.

Various methods, such as fusion of Gd and Mg under pressure of an inert gas, replacing a halide of Gd by Mg, and new methods used in this investigation. Data are tabulated. 11 ref. (E10, Mg, Gd)

446-E. (French.) **Square and Filleted Angles in Die Casting.** R. Grunberg. *Métallurgie et la Construction mécanique,* v. 84, May 1952, p. 311, 313.

Optimum shapes for die casting. Advantages of correct angle formation. Example of a zinc die casting. Diagrams and photograph. (E13, Zn)

447-E. (French.) **Internal Stresses and Service Life of Molds for Centrifugal Castings.** Hans Bühler. *Métaux: Corrosion—Industries,* v. 27, Apr. 1952, p. 164-168.

Above relationship was investigated. Tables and graphs contain data on special low-alloy steels for such molds, and on factors affecting their service life. (E14, Q25, AY)

448-E. (German.) **Determination of the Formation of Shrinkage Cavities in Malleable Cast Iron.** A. Bordes. *Giesserei,* v. 39, May 1, 1952, p. 201-203.

New method facilitates determination of the tendency toward formation of shrinkage cavities, and of the various factors acting upon it. Diagrams and photographs. (E25, CI)

449-E. (German.) **Suggestions for Examination of Core Sands, Core Binders, and Cores.** F. Roll. *Giesserei,* v. 39, May 1, 1952, p. 203-207.

Chemical, microscopic, physical, and technological suggestions for examining cores and core materials,

on the basis of the literature. 31 ref. (E21, E18)

450-E. (German.) **The Sand Triangle.** H. Jungbluth. *Giesserei,* v. 39, May 15, 1952, p. 225-232.

Problems of foundry-sand test standardization in Germany. Method suggested by W. Reitmeister, as discussed by W. Götz. Numerous graphs. (E18)

451-E. Vampire Canopy: the Construction of the de Havilland Night-Fighter Cockpit Enclosure. Part I. Castings. *Aircraft Production,* v. 14, June 1952, p. 186-190.

Production of Mg alloy and Al alloy sand castings for airplane cockpit. Molds, pouring, and pattern construction. (To be continued.) (E11, Mg, Al)

452-E. Oxygen in the Malleable Foundry. J. B. LaPota and L. H. DeWald. *American Foundryman,* v. 22, July 1952, p. 35-41.

Merits of oxygen for better melting and annealing. Graphs and diagrams. (E10, J23, CI)

453-E. Easier, Surer Identification With Colored Core Sands. L. C. Voss and W. W. Lynn. *American Foundryman,* v. 22, July 1952, p. 44-45.

How to add small additions of organic dyestuff to core sands to lend a characteristic color. This aids in distinguishing one sand from the other, shows undermixing, prevents poor distribution or mixing of sand, indicates faulty core structure, and points out uncured cores. (E18)

454-E. Shell Mold Process Casts Stainless. Irving Stone. *Aviation Week,* v. 57, July 14, 1952, p. 33-34, 36, 38, 41.

Work of Cooper Alloy Foundry Co., Hillside, N. J. (E16, SS)

455-E. Carbon Pick-Up. H. T. Angus. *British Cast Iron Research Association Journal of Research and Development,* v. 4, June 1952, p. 360-364.

Relative value of various methods by which improved carbon pickup has been attempted for iron castings. Methods of raising and factors promoting carbon pickup. (E25, CI)

456-E. Flow of Metal. *Foundry Trade Journal,* v. 92, June 26, 1952, p. 673-680.

Results of an experimental study, using motion-picture photography. Normal green-sand molds, open at the top, were used. 16 illustrations show frames from 10 series of shots representing different pouring situations. (E23)

457-E. Probable Trends in British Steelfoundry Practice. F. Cousans. *Foundry Trade Journal,* v. 92, June 26, 1952, p. 685-688.

Steelmaking, other melting factors, sand practice, molding, coremaking, the "C" process, cleaning and dressing, materials handling, production control and planning, training schemes, housekeeping, and foundry methods. (E general, D general, CI, ST)

458-E. Cores Instead of Loose Pieces. F. H. Wakeham. *Foundry Trade Journal,* v. 92, June 26, 1952, p. 691.

Casting of a brake pulley almost entirely by use of cores. Use of three cores dispenses with necessity of a three-part mold, and with loose pieces on the pattern. Diagrams. (E21)

459-E. Gas Removal From Molten Aluminium Alloys. A. W. Brace. *Foundry Trade Journal,* v. 93, July 3, 1952, p. 3-11.

Reviews the work that has been done on the removal of dissolved gas, mainly H_2, from molten Al alloys. Mechanism of gas absorption and removal, including sources of hydrogen, mechanism of absorption, factors affecting porosity and its distribution, and conditions for removal of gas from the melt. Application in production of castings under normal foundry conditions. Effect of chlorine and volatile chlorides on the soundness of castings. 23 ref. (E25, Al)

460-E. Knock-Off Feeding Heads. J. R. Robinson. *Foundry Trade Journal,* v. 93, July 3, 1952, p. 13-19.

Two practical methods of feeding castings are use of exothermic core compounds, and use of the Connor block or hot lip-runner. (E23)

461-E. Qualities Required in Corebinders. D. Lane. *Foundry Trade Journal,* v. 93, July 3, 1952, p. 21-22.

Properties of corebinders, with particular reference to those used for oil-sand cores. Suggests various combinations of binders to suit particular purposes. Not confined to resins. (E18)

462-E. The Effect of Metal-Mould Reaction on 85:5:5:5 Leaded Gun-Metal Sand Castings. N. B. Rutherford. *Journal of the Institute of Metals,* v. 80, June 1952, p. 555-568.

Effect of gas absorption on strength and pressure-tightness. Varying degrees of metal-mold reaction were induced in 85:5:5:5 leaded gun-metal by casting it into green-sand molds at four pouring temperatures between 1050 and 1200° C., and by varying the residual P content from 0.002 to 0.15%. Effect on the properties was determined from tensile test-pieces. The work was designed as a factorial experiment, and the results were examined by

statistical methods. Some production trials, together with notes on fracture and grain size. Diagrams, graphs and photographs. 19 ref. (E23, Q27, M27, Cu)

463-E. Internal Cam at Low Cost by Die Casting. S. Broadwin. *Precision Metal Molding,* v. 10, July 1952, p. 27.

How a marked decrease in machining time was secured by incorporating a camming surface, a housing, and cam pins into a Zn die casting used in a knitting machine. (E13, Zn)

464-E. Effective Use of Die Castings for Limited Production Runs. *Precision Metal Molding,* v. 10, July 1952, p. 28-30.

Use of Zn die castings in check perforators. In spite of short runs, die castings are economical. (E13, Zn)

465-E. The White Sewing Machine. A Good Example of Design for Molded Precision Parts. Lovell Shockey. *Precision Metal Molding,* v. 10, July 1952, p. 33-35, 78.

Foundry practices at White Sewing Machine Corp., Cleveland. Changes made over a period of years and reason for each change. Die castings investment castings, and powdered metal parts in miscellaneous ferrous and nonferrous metals. (E13, E15, H general)

466-E. Designer-Foundry Collaboration Uses Advantages of Plaster Mold Casting. J. B. Savits. *Precision Metal Molding,* v. 10, July 1952, p. 36-38, 41.

Manufacture of metal gripper "fingers" used in tea-bag assembly with plaster-mold castings of Mn bronze. (E16, Cu)

467-E. Component Inventory Reduced by Investment Casting. *Precision Metal Molding,* v. 10, July 1952, p. 43.

Simplification of typewriter margin-stop manufacture by conversion from a plurality of machined parts assembled by brazing to investment casting in Be-Cu. (E15, Cu)

468-E. Automatic Core Maker Pneumatically Powered. *Product Engineering,* v. 23, July 1952, p. 140-141.

Machine made by Osborn Mfg. Co., Cleveland. Photographs and diagrams. (E21)

469-E. How Northrop Aircraft Vacuum Impregnates Metal Castings. Thomas A. Dickinson. *Steel,* v. 131, July 14, 1952, p. 88-90.

Specialized techniques adapted to impregnating Al and Cu alloys with sodium silicate, vinyl lacquers, styrene, and phenol-formaldehyde resins. (E25, Al, Cu)

470-E. (Book) **Patternmaking.** L. L. Cox. Sir Isaac Pitman & Sons, Ltd., Parker St., Kingsway, London, W.C. 2, England. 12s., 6d.

The making of wooden patterns. The illustrations, sketches, and examples are clear, comprehensive and up-to-date. Questions follow each of the 19 chapters. (E17)

471-E. (Book) **Defauts de Fonderie.** (Foundry Defects.) Francois Boussard. 424 pages. 1952. Dunod, 92 Rue Boneparte, Paris 6, France. 2700 fr.

72 examples of foundry defects are dealth with in detail under eight headings, broadly classified according to cause. Formation, appearance, specific cause, and remedy. Extensive tables provide a classification of defects by appearance, a listing of effective precautions, and an international numerical classification for indexing defects. (E general)

472-E. Design-Production Teamwork Key to Foundry Engineering Advances. *Canadian Metals,* v. 15, July 1952, p. 26-27.

Several case-records on steel castings as evidence of value of the recommended teamwork. Photographs. (E general, CI)

473-E. New Melting Process Reclaims Borings. *Canadian Metals,* v. 15, July 1952, p. 30-32.

Process developed by Crofts (Engineers) Ltd., England, involving forcible injection of untreated cast-iron borings into the melting zone of the foundry cupola. (E10, CI)

474-E. Basic Refractories for Cupola Service. M. W. Demler. *Canadian Metals,* v. 15, July 1952, p. 33-34.

See abstract, *American Foundrymen's Society,* Preprint 52-20, 1952; item 413-E, 1952. (E10)

475-E. Cast Iron Research Laboratories. *Chemical Age,* v. 67, July 12, 1952, p. 53-55.

Brief listing of research investigations now being conducted at Bordesley Hall, Birmingham, England. Nodular-graphite formation in the as-cast condition with special reference to interfering elements; effect of gases on properties of cast iron; direct reading methods for cast-iron analysis and determination of trace elements in cast iron; causes of enameling defects; properties of sand at high temperatures, and many others. (E general, A9, CI)

476-E. New Data on Ductile Cast Iron. Alexander I. Krynitsky and Harry Stern. *Industrial Heating,* v. 19, July 1952, p. 1219-1220, 1356.

See abstract of "Experimental Production of Nodular Graphite in

Cast Iron." *Foundry;* item 256-E, 1952. (E25, M27, CI)

477-E. Pressure Die-Casting of Aluminimum. Part I. Design. Part II. Selection of Alloy. Part III. Holding Furnaces. Part IV. Die Casting Machines. Part V. Design of the Die. H. J. Sharp. *Metal Industry,* v. 81, July 4, 1952, p. 6-9; July 11, 1952, p. 27-28; July 25, 1952, p. 63-67; Aug. 1, 1952, p. 83-86.

Photographs, graphs, diagrams and tables. (To be continued.) (E13, Al)

478-E. Foundrymen Discuss Shell Molding and Ductile Iron. *Metal Progress,* v. 62, July 1952, p. 93-95, 146-147.

Reports on the Naval Foundry Conference at Norfolk Naval Shipyard and the International Congress of the American Foundrymen's Society, Atlantic City. Brief data on mechanical properties of ductile iron. (E16, Q general, CI)

479-E. Mold Blowing Reaction. *Metal Progress,* v. 62, July 1952, p. 176. (Condensed from "A Contribution on the Metallic Mould Blowing Reaction", V. Kondic, G. Martin, and K. Bromage.)

Previously abstracted from *Metallurgia.* See item 282-E, 1952. (E25, Fe, ST, Sn, Cu)

480-E. Hydraulics Applied to Molten Aluminum. D. S. Richins and W. O. Wetmore. *Transactions of the American Society of Mechanical Engineers,* v. 74. July 1952, p. 725-732.

Some of the more common fluid-dynamic properties of a molten Al alloy when flowing in sand ducts were evaluated in the initial phase of an investigation to determine the effects of various configurations of casting flow systems upon casting quality. Graphs, photographs, tables. 10 ref. (E25, Al)

481-E. (French.) Mechanized Casting of Hotchkiss-Gregoire Automobile-Body Cowling. Charles Roinet. *Revue de l'Aluminium,* v. 29, May 1952, p. 187-195.

Equipment and procedures. Material is an Al alloy. (E general, Al)

482-E. (German.) Filling of the Dies in Pressure Casting. G. Lieby. *Giesserei,* v. 39, June 2, 1952, p. 311-315.

Mode of filling of dies is discussed on the basis of hydrodynamic laws. Recommendations for choice of dies, position of casting, etc. Schematic diagrams. (E13)

483-E. (Swedish.) Monolithic Cupola Linings. Folke Sandford and Stig Fransson. *Gjuteriet,* v. 42, June 1952, p. 91-95.

Laboratory tests showed that the strain in the cupola shell when using a rammed silica-base cupola lining is not so large that there is any risk that a normally dimensioned cupola shell should break due to thermal expansion on heating or its growth on transformation of the silica to cristobalite. Tables and graphs. (E10)

484-E. (Swedish.) The Effect of Mold Material on Gas Content of Red Bronze Castings. T. Malmberg. *Gjuteriet,* v. 42, June 1952, p. 96-103.

By density determinations on different parts of DTD test bars, cast of red bronze, it was established that moisture content of the molding sand may cause porosity. Different mold materials were investigated; clay-bonded sands both green and dry, sands bonded with special chemicals, and molds lined with sheet metal. A statistical survey was made of density of the feeder heads as well as the test bars as a function of pouring conditions. 10 ref. (E18, Cu)

485-E. Synthetic Resins for Foundry Use. *Engineer,* v. 194, July 1952, p. 85-86.

Materials and techniques under investigation and development at Imperial Chemical Industries Ltd., Plastics Division, Welwyn, England. (E18)

486-E. Selection, Testing and Use of Bonding Clays in Synthetic Molding Sand. W. W. Kerlin, *Foundry,* v. 80, Aug. 1952, p. 86-91, 223-224, 226.

Treatment of chemical analyses, fusion points, plasticity, clay material in foundry sand, and physical properties of various clays. Graphs, diagrams, photographs, and tables. (E18)

487-E. Gating for Shell Molding. Walter A. Sokolosky. *Foundry,* v. 80, Aug. 1952, p. 92-93.

Fundamentals of gating of castings to be made in shell molds. Shell molds are compared with green-sand molds and the difference noted. Diagrams. (E22, E19)

488-E. Refractory Permanent Molds. J. B. McIntyre. *Foundry,* v. 80, Aug. 1952, p. 102-103, 228, 232.

Development of molds from prehistoric times to the present. Primarily concerned with present-day refractory mold materials and problems. (E12, E19, SG-h)

489-E. Simple Correlation in the Foundry. W. K. Bock. *Foundry,* v. 80, Aug. 1952, p. 104-109.

Fundamentals of correlation, its limitations and precautions to take in its application. Correlation permits use of simple tests to get information not otherwise available

and provides some measurement to improve foundry operations. (E general)

490-E. Induction Furnace Melting of Corrosion-Resistant Alloys. B. Spindler. *Foundry,* v. 80, Aug. 1952, p. 110-113.

Production melting equipment and foundry technique used in casting Ni-base alloys and high-alloy stainless steels. Production problems. Photographs. (E10, AY, SS, Ni)

491-E. Process Control of Cast Iron for Vitreous Enamelling. J. Bernstein. *Foundry Trade Journal,* v. 92, June 5, 1952. p. 603-606; v. 93, July 10, 1952, p. 49-54.

Experiences in the production of iron castings for wet-process vitreous enameling, the products being designed for domestic and industrial applications. Second installment includes cleaning and enameling operations. Photomicrographs. (E11, L27, CI)

492-E. Thermal Expansion and Contraction of Compacted Steel-Founding Sands and Mould Washes. D. V. Atterton. *Foundry Trade Journal,* v. 93, July 17, 1952, p. 61-68.

Length changes that occur during the heating and cooling of small, dried compacts of various molding materials were investigated. A theory is proposed to explain the variations observed. Castings defects caused by volume instability in the mold material are discussed in the light of the results, which suggest that differential expansion between the facing sand and underlying sand is the primary cause of scabs. 11 ref. (E18)

493-E. Manufacture of High-Quality Steel Castings at an Economic Price. J. J. Dewez. *Foundry Trade Journal,* v. 93, July 10, 1952, p. 33-37; July 17, 1952, p. 77-80.

Design; drafting-room cooperation; quality control; sampling; melting; heat treatment; and inspection. Schematic drawings. (E general, J general, S13, CI)

494-E. Nitrogen Degassing & Metal Mould Reaction in the Production of Gunmetal Castings. E. C. Mantle. *Foundry Trade Journal,* v. 93, July 24, 1952, p. 95-98; disc., p. 99-100.

Laboratory and foundry experimental work. Nitrogen-degassing technique. (E25, Cu)

495-E. Metals Melted Without Crucibles. E. K. Okress and D. N. Wroughton. *Iron Age,* v. 170, July 31, 1952, p. 83-86.

Westinghouse's induction levitation method. Metals are heated, melted, and stirred with no support other than magnetic fields. Process shows promise for production of pure high-temperature metals, for alloying, and for sintering. Al, Al bronze, Ti, and Ag have been treated with varying success in air and in vacuum. Diagrams and photographs. (E10, Al, Ti, Ag, EG-d)

496-E. U. F. and P. F.; the Use of Synthetic Resins in the Foundry. *Metal Industry,* v. 81, July 25, 1952, p. 70-71.

Urea and phenolformaldehyde resins for core binders. The shell-molding process. (E18, E16)

497-E. Investment Casting Method for Superalloy Parts Lowers Cost—Improves Design—Saves Material. Clarence E. Levoe. *Western Metals,* v. 10, July 1952, p. 44-47.

System of investment casting used successfully on superalloy aircraft and guided-missile parts. (E15, SG-h)

498-E. Technique for Vacuum Impregnation of Non-Ferrous Castings Is Used at Northrop. Frank Charity. *Western Metals,* v. 10, July 1952, p. 48-49.

Impregnation of Al and Cu alloys with sodium silicate, vinyl lacquers, styrene, and phenolformaldehyde resins. (E25, Al, Cu)

499-E. (French.) Experimental Study on the Efficiency of Recirculation in Foundry Furnaces. (Concluded.) **Part III. Results.** Georges Ulmer. *Fonderie,* June 1952, p. 2971-2982.

Tests with full-furnace charge. Heat input, output, and losses are indicated and related to the problem of recirculation. Tables and graphs. (E10)

500-E. (French.) Study on Concretion, and Its Remedies. Pierre Nicolas. *Fonderie,* June 1952, p. 2983-2984.

Foundry defect, also known as "galling", is characterized by penetration of the metal underneath "tongues" of sand partially detached from the mold. Causes and remedies. (E19)

501-E. (French.) Exhausting of Fumes From Crucible Furnaces. *Fonderie,* June 1952, p. 2985-2990.

Structural details for eliminating fumes from furnaces melting Cu and light alloys. Diagrams and illustrations. (E10, Cu, Al, Mg)

502-E. (French.) Some New Methods in Steel Foundry Practice. P. Blanchard. *Métallurgie et la Construction Mécanique,* v. 84, June 1952, p. 413-415, 417-418.

Improvements in feedheads, and the advantages of centrifugal casting. (E14, E23, CI)

503-E. (French.) Die Casting in the Construction of a Household Appliance. R. Grunberg. *Métallurgie et la*

Construction Mécanique, v. 84, June 1952, p. 421, 423, 425.

Zn die casting technique, using structural parts of the Hoover vacuum cleaner as an example. (E13, Zn)

504-E. Better Control of Malleable Iron: New Tuyeres Improve Blast Penetration. Lewis Koch. *American Foundryman,* v. 22, Aug. 1952, p. 36-38.

How a tuyere of novel design has helped improve duplex melting operations in a malleable foundry. Diagrams, graphs, and illustrations. (E10, CI)

505-E. Current Status of Shell Molding. Richard Herold. *American Foundryman,* v. 22, Aug. 1952, p. 42-46.

See abstract of "Sand Casting With Croning Process Shell Molds", *Canadian Metals,* item 316-E, 1952. (E16, Al, CI, AY)

506-E. For Accurate Green Sand Test Results Standardize, Maintain Testing Equipment. *American Foundryman,* v. 22, Aug. 1952, p. 53-55.

Standardization and maintenance of sand-testing equipment. Availability of standard checking devices for measuring performance of testing equipment. (E18)

507-E. How to Produce High-Quality Aluminum Die-Castings. Henry H. Ryffel. *Machinery* (American), v. 58, June 1952, p. 170-175; Aug. 1952, p. 152-155.

Equipment and procedures of Hoover Co., North Canton, Ohio. Tabular data and illustrations. (E13, Al)

508-E. Shell Mold Casting of Stainless Steel. *Machinery* (American), v. 58, Aug. 1952, p. 184-187.

Equipment and procedures of Cooper Alloy Foundry Co., Hillside, N. J. (E16, SS)

509-E. Mechanized Foundry Layout. *Mechanical Handling,* v. 39, Aug. 1952, p. 378-382.

Triplex Foundry, Ltd., Great Bridge, Staffs, England, producer of repetition casting for grates. Photographs and detailed diagrams. (E general, CI)

510-E. Rotary Melting Furnaces. *Metal Industry,* v. 81, Aug. 1, 1952, p. 90-91.

Furnaces made by a British firm. Fuel consumption and melting times of a 2-ton furnace applied to steel, high-duty iron, malleable iron, copper, gunmetal, and aluminum. (E10, ST, CI, Cu, Al)

511-E. Solidification of Gray Iron. *Metal Progress,* v. 62, Aug. 1952, p. 124, 126, 128. (Condensed from "Solidification of Gray Iron in Sand Molds", R. P. Dunphy and W. S. Pellini, *Naval Research Laboratory,* Report 3792, Jan. 17, 1951.)

Previously abstracted from *American Foundrymen's Society,* Preprint 22, 1951. See item 283-E, 1951. (E25, N12, CI)

512-E. Impregnation of Castings. *Metal Progress,* v. 62, Aug. 1952, p. 154, 156. (Condensed from "Vacuum Impregnation of Castings", L. W. Hull, *Journal of Metals.)*

Previously abstracted from original. See item 134-E, 1952. (E25)

513-E. Costs Cut 30% by Investment Castings. *Precision Metal Molding,* v. 10, Aug. 1952, p. 30-31.

Type 303 stainless and SAE 1020 investment-cast gunsights made by Hitchiner Mfg. Co., West Hartford, Conn. Advantages over machined parts. (E15, T2, SS, CN)

514-E. Beryllium Copper Cavities for Die Castings. *Precision Metal Molding,* v. 10, Aug. 1952, p. 32-34.

Cavities previously used only for plastic molding are now used successfully for high-quality Zn die castings. Physical properties of beryllium copper, service characteristics of the cavities, methods of forming them, normal tolerances that can be held, and limitations on shape. They are produced by pouring around a master steel hob and immediately applying pressure. (E13, T5, Cu, Zn)

515-E. Pressure-Tight Bronze Investment Castings. *Precision Metal Molding,* v. 10, Aug. 1952, p. 35.

For pump housing cast in Si bronze. When nonporosity is coupled with complex coring, use of investment casting allows substantial savings to be made. (E15, T7, Cu)

516-E. Techniques for Melting Aluminum. J. L. Stroman. *Precision Metal Molding,* v. 10, Aug. 1952, p. 41-42, 80-81.

Two-chamber melting furnace overcomes problems caused by adding cold metal to molten bath. (E10, Al)

517-E. (Book) Die-Casting. Ed. 2. Charles O. Herb. 310 pages. 1952. Industrial Press, 140-148 Lafayette St., New York 13, N. Y. $4.50.

The chapters relating to die-casting machines, die-casting alloys, and steels for dies and die components have been extensively revised. New examples of unusual die castings have been added—including a detailed description of an induction-motor rotor die-cast as a single unit around stacked laminations. The latest models in automatic and manually operated die-casting ma-

chines are illustrated. Six new tables of die-casting alloy compositions and properties have been added. (E13)

518-E. (Book) **Metallurgy for Engineers: Casting, Welding, and Working.** John Wulff, Howard F. Taylor, and Amos J. Shaler. 624 pages. 1952. John Wiley & Sons, Inc., 440 4th Ave., New York 16, N. Y. $6.75.

The first half of the book explains the concepts and principles that underlie metal processing from ingots to finished articles of commerce. The second half deals with the processes themselves. Written from the engineering rather than the shop viewpoint.
(E general, F general, G general, K general)

519-E. (Book—Russian.) **Sviaziushchie Materialy dlia Sterzhnei.** (Binding Materials for Cores) I. B. Kumanin and A. M. Liass. 272 pages, 1949. Government Publishing House for the Defense Industries, Moscow, U.S.S.R.

Theoretical bases of the action of core binders and practical information on their application in foundries and casting departments. Properties and special features of individual binders used in the U.S.S.R. Methods of testing binders. (E18)

520-E. Fluid Mechanics Applied to Founding. D. S. Richins and W. O. Wetmore. American Foundrymens Society "Symposium on Principles of Gating", 1951, p. 1-23; disc., p. 23-24.

Study of flow characteristics of molten Al in molding sands. Tests were designed and analyzed according to accepted fluid mechanics' principles. Determination made of various flow losses and effect of discontinuities which create riling and agitation in systems consisting of pouring basins, downsprues, horizontal runners, and some gates. Tables and photographs. 14 ref. (E22, Al)

521-E. Tentative Design of Horizontal Gating Systems for Light Alloys. L. W. Eastwood. American Foundrymen's Society "Symposium on Principles of Gating", 1951, p. 25-30.

Based on a study at Battelle Memorial Institute under direction of Research Committee of the Aluminum and Magnesium Division, American Foundrymens Society. Supporting evidence and data were published earlier. Sketches and detailed drawing. (E22, Al, Mg)

522-E. Relation of Casting Quality to Gating Practice. W. H. Johnson, H. F. Bishop, and W. S. Pellini. American Foundrymen's Society "Symposium on Principles of Gating", 1951, p. 31-38; disc., p. 38-39.

Study of effects of gate design and associated metal flow conditions on casting quality. It was found that the type of gating for steel and gray iron is unimportant provided inflow velocities are not excessive. Drossing metals such as Al and Mn bronze require specialized gating procedure and the use of moderately choked systems is indicated. Numerous photographs.
(E22, CI, Al, Cu)

523-E. Considerations in Feeding of Castings. A. K. Higgins. American Foundrymen's Society "Symposium on Principles of Gating", 1951, p. 40-50; disc., p. 50.

A discussion to clarify factors that influence soundness and density of the cast shape, with particular reference to long freezing range alloys. Major variables involved; theory; types of freezing range; mechanisms of feeding; effect of demand rate; rate of flow; feed pressures; rate of solidification; and step feeders. Brief mention of Cu, Cu-Ni alloys, Sn bronze, and Al bronze. Photograph, graphs, and diagrams.
(E23, Cu, Ni)

524-E. Gating Aluminum Castings. T. E. Kramer. American Foundrymen's Society "Symposium on Principles of Gating", 1951, p. 51-56; disc., p. 56.

Foundry gating experiences in part based on ideas from the AFS film on "Principles of Gating." Photographs and diagrams.
(E22, Al)

525-E. Application of Gating and Risering Studies to Production Castings. J. B. Caine. American Foundrymen's Society "Symposium on Principles of Gating", 1951, p. 57-60.

Pitfalls in the practical application of laboratory results, principally to steel castings. Radiograph and table. 10 ref. (E22, CI)

526-E. Application and Value of Gating Principles Recomended by the A.F.S.-Battelle Film "Fluid Flow in Molds" to Steel Castings. J. H. Lowe and J. Austin. American Foundrymen's Society "Symposium on Principles of Gating", 1951, p. 61-65; disc., p. 65.

Illustrated examples of principles and modifications, applied to production castings. Discussion of quality of results. Tables, chart, and diagram. (E22, CI)

527-E. Gating and Risering Tin Bronze Castings. Bernard N. Ames. American Foundrymen's Society "Symposium on Principles of Gating", 1951, p. 66-74.

Successful practices at the New York Naval Shipyard. Effect of nucleation on dendrite growth and grain size, effect of cooling rate on grain size and shape, and on mechanical properties. Photographs and drawings. (E22, N12, Cu)

528-E. The Why of Gate and Feeder Design. Frederick G. Sefing. American Foundrymen's Society "Symposium on Principles of Gating", 1951, p. 75-80; disc., p. 80-81.

Basic principles of design with illustrated examples. Includes table of theoretical feeder capacity for gray iron (three types), white iron (two types), steel, and Ni-Resist. (E22, CI)

529-E. Gating and Risering of Malleable Iron Castings. E. C. Zirzow. American Foundrymen's Society "Symposium on Principles of Gating", 1951, p. 82-91; disc., p. 82.

Brief discussion and nine pages of photographs showing actual production patterns. (E22, CI)

530-E. Gating and Risering of Copper-Base Alloy Castings. W. W. Edens. American Foundrymen's Society "Symposium on Principles of Gating", 1951, p. 92-93.

Emphasis on solidification characteristics of four Cu-base alloys; red brass 85-5-5-5, Navy G, 70000 Mn bronze, and Al bronze. (E22, Cu)

531-E. Foundry Quality Control. A. A. Evans. American Society for Quality Control. "Quality Control Conference Papers, 1952", p. 381-392.

Experiences and procedures at International Harvester Co. Photographs and charts. (E general, S12)

532-E. Production of Ingot Moulds by Sandslinger in a Mechanized Foundry. J. Raymond Jones. *Foundry Trade Journal,* v. 93, July 24, 1952, p. 101-105; July 31, 1952, p. 131-135.

Equipment and procedures of British firm. (E11, CI)

533-E. Aluminium Matchplate Patterns by the Pressure-Cast Plaster Process. I. American Practice. E. C. Mantle. **II. British Developments.** D. H. Potts. *Foundry Trade Journal,* v. 93, July 31, 1952, p. 117-124; disc., Aug. 7, 1952, p. 157-160.

Descriptions include numerous illustrations. (E16, Al)

534-E. Production of Sound Castings. H. W. Griffiths. *Foundry Trade Journal,* v. 93, Aug. 7, 1952, p. 153-155; disc., p. 155-156.

The main emphasis is on running and feeding methods. Chiefly concerns exothermic material and Connor-block running. Numerous diagrams. (E23)

535-E. Process Control of Cast Iron for Vitreous Enamelling. *Foundry Trade Journal,* v. 93, Aug. 7, 1952, p. 163-166.

Discussion of paper by J. Bernstein in June 5 and July 10 issues; see item 491-E, 1952. (E11, L27, CI)

536-E. Charge-Level Indicator for Cupolas. *Foundry Trade Journal,* v. 93, Aug. 7, 1952, p. 167.

Briefly described and diagrammed. (E10)

537-E. Role of the Research Foundry Unit. G. A. Lillieqvist. *Foundry Trade Journal,* v. 93, Aug. 7, 1952, p. 145-152; Aug. 14, 1952, p. 187-191; disc., Aug. 21, 1952, p. 217-219.

Emphasis on organization of American Steel Foundries, Inc., East Chicago, Ind. Laboratory layout and some specific projects. Diagrams, graphs, and illustrations. (E general, A9, CI)

538-E. Foundry: Shell Molds for Job Shops. K. W. Bennett. *Iron Age,* v. 170, Aug. 21, 1952, p. 63.

A Chicago company is considering selling shell molds on a jobbing basis to smaller foundries in the Midwest. Molds would be made by Powdered Metal Products Corp. on a new machine which the company has built and tested. (E16)

539-E. Foundry Mechanization; a Survey of Modern Methods and Equipment. J. Bain. *Iron & Steel,* v. 25, July 1952, p. 329-332; Aug. 1952, p. 369-372.

Belt conveyers, bucket elevators, magnetic separation, screens, chutes and storage hoppers; also new sands and bonding materials, sand mills, disintegrators, molding machines, mold conveyers, pouring runways, casting-cooling conveyers, and core shops. Diagrams. (E general, A5)

540-E. Dowlais Foundry. *Iron & Steel,* v. 25, Aug. 1952, p. 367-368.

Account of how a British foundry has been modernized to meet present demands. (E general)

541-E. Synthetic Resins; Application in Coremaking and Moulding. *Iron & Steel,* v. 25, Aug. 1952, p. 379-380.

(E18)

542-E. A Shell Moulding Process. *Light Metals,* v. 15, Aug. 1952, p. 268-269.

Use of new technique for making complex parts of alloy steel, by Polygram Casting Co., London. (E16, AY)

543-E. Discussion on "Modern Foundry Practice". *North East Coast Institution of Engineers and Shipbuilders Transactions,* v. 68, July 1952, p. 121-128.

Discussion of paper by T. W.

Bushnell (item 402-E, 1952). Includes author's replies. (E general, CI)

544-E. Relation Between Melting Conditions and Casting Defects in Iron Casting. Nobutaro Kayama. *Reports of the Casting Research Laboratory,* No. 3, 1952, p. 3-5.

Experimental procedure. Results tabulated, illustrated, and discussed. Effect of mechanism of oxidation and reduction. (E25, CI)

545-E. Studies of Gases Evolved on Solidification of Molten Cast Iron. Ichiro Iitaka and Minao Otsuka. *Reports of the Casting Research Laboratory,* No. 3, 1952, p. 15-16.

Experimental results on cupola iron and Swedish charcoal pig iron, with seven different treatments. Graphs. (E25, CI)

546-E. Studies of Gases Evolved on Solidification of Molten Cast Iron. Minao Otsuka. *Reports of the Casting Research Laboratory,* No. 3, 1952, p. 26-30.

Experimental apparatus diagrammed. Data tabulated, charted, and discussed. (E25, CI)

547-E. Studies on Metal Penetration in Castings. Jiro Kashima. *Reports of the Casting Research Laboratory,* No. 3, 1952, p. 31-36.

Experiments were conducted on a series of Cu alloys with Zn, Sn, Al, and Sn+P; on effects of mold washes; and on oxidation rate of various types of Cu-alloy castings at elevated temperatures. Tables and graphs. (E19, Cu)

548-E. Studies on Molding Sand Binders. Toshisada Makiguchi. *Reports of the Casting Research Laboratory,* No. 3, 1952, p. 37-42.

Influences of concentration of H ion in water added to inorganic binders, especially clay-type binders. Variation of binding strength when acid, alkali, or strong electrolytes were mixed into water added to a kaolin or montmorillonite type binder. Variation of degree of sedimentation of the clay suspension, as well as the relationship between variation of binding strength and that of degree of sedimentation. Tables and graphs. (E18)

549-E. Studies on Camlachie Cramp. Tsunemitsu Muraki. *Reports of the Casting Research Laboratory,* No. 3, 1952, p. 43-45.

Fusion between foundry chaplets and the metal being cast was studied. Soft-steel chaplets plated with Ag, brass, Cu, Ni, and Cr were used in a dry sand mold and gray iron cast around them. Microstructure of the interfaces between chaplet stems and the cast iron was studied. Use of powdered metals bonded with silicates or linseed oil was also studied. Results are charted, tabulated, and illustrated. (E19, CI)

550-E. On the Flow-Dynamic of Molten Metals. Kiyoshi Yokota. *Reports of the Casting Research Laboratory,* No. 3, 1952, p. 52-55.

Flow rates of molten Hg along paraffin channels (various degrees of smoothness) were studied, as an aid in study of optimum conditions for pouring of molten metals into molds. Diagrams and graphs. (E25)

551-E. (German.) **Synthetic Casting Sand, Its Application and Usefulness in Gray Iron and Steel Casting.** H. Gries and W. Trommer. *Giesserei,* v. 39, July 10, 1952, p. 333-341.

Types of sand, control of composition, costs, characteristics of sands used, and results achieved with various types in the foundry. Diagrams, charts, and photographs. 28 ref. (E18, CI)

552-E. (German.) **Use of Synthetic Molding Sands.** K. Houben. *Giesserei,* v. 39, July 1952, p. 341-343.

Various types. Illustrations show molds and cores for several large machinery castings, made of synthetic sand. (E18, CI)

553-E. Melting Practice for Magnesium-Base Alloys. L. W. Eastwood. *Canadian Metals,* v. 15, Aug. 1952, p. 34, 36-38.

See abstract of "Melting Aluminum and Magnesium-Base Alloys," *Transactions of the American Foundrymen's Society,* item 66-E, 1952. (E10, Al, Mg)

554-E. Revolution in the Foundry. *Canadian Metals,* v. 15, Aug. 1952, p. 40-41.

Pros and cons of shell molding now being used in foundry work. (E16)

555-E. Designing for Shell Molded Castings. *Electrical Manufacturing,* v. 50, Sept. 1952, p. 119-121, 328, 330, 332, 334.

Advantages and pattern design. Method can be used to cast gray, nodular, and malleable iron; low-carbon, high-alloy, high-Cr alloy, and Types 304 and 316 stainless steels. (E16, CI, CN, AY, SS)

556-E. Statuary to Electronics Via Plaster Molding. Frank Pfister. *Foundry,* v. 80, Sept. 1952, p. 86-91.

Casting in plaster of solid-solution alloys with attention to individual processes. Photographs show phases of molding, and type of castings produced. (E16)

557-E. Sand Reclamation at the Eddystone Plant. Karl S. Howard and Clyde B. Jenni. *Foundry,* v. 80, Sept. 1952, p. 92-95, 272, 274, 276.

Methods, advantages, and cost. Photographs, tables, and diagram. (E18)

558-E. Develops New Process for Casting Stock Bushings. J. Gilbert Hill. *Foundry,* v. 80, Sept. 1952, p. 98-99.

New method developed by M. L. Hart, Oklahoma City. The molds are formed in a vertical position and then filled with metal while in a horizontal position. The castings are claimed to be superior in many respects to those made by conventional methods. (E19)

559-E. Core Serves as Gate and Riser. Ben F. Sweet. *Foundry,* v. 80, Sept. 1952, p. 96-97, 236.

Method devised for use in blank gears and sprocket wheels. Explanation and diagrams. (E22)

560-E. Enlarged Malleable Iron Foundry Is Model of Good Housekeeping. Frank G. Steinbach. *Foundry,* v. 80, Sept. 1952, p. 100-105, 278, 280-282, 284.

Equipment and practices at Albion Malleable Iron Co., Albion, Mich. (E11, CI)

561-E. Accuracy Is Byword in Fine-Hardware Foundry. *Foundry,* v. 80, Sept. 1952, p. 106-107, 212, 214.

A general description of the Chautauqua Hardware Corp., Jamestown, N. Y., which specializes in bronze and brass hardware. (E11, Cu)

562-E. Casting Stainless Steel in Shell Molds. *Foundry,* v. 80, Sept. 1952, p. 108-111.

(E16, SS)

563-E. Miniature Cupola Aids in Melting Study. John F. Drenning. *Foundry,* v. 80, Sept. 1952, p. 151.

Measurements, performance, and availability. (E10, CI)

564-E. Plaster and Plastics Combine in New Pattern Material. Thomas A. Dickinson. *Foundry,* v. 80, Sept. 1952, p. 174, 177, 180.

Patterns are made by casting and dehydrating least expensive types of plaster, so that the latter can be impregnated with polymerizable-resin solutions. It is then possible to heat-cure casts to be comparable to wood or cast plastic articles for practical purposes. (E17)

565-E. Increasing Scrap Charging in the Cupola. Lewis H. Gross. *Foundry,* v. 80, Sept. 1952, p. 182, 187-188, 190.

Good castings can be made from Fe melted in cupola where the charge contains high percentage of scrap, by use of metallurgical knowledge. Recommended procedures. (E10, CI)

566-E. Investment Casting. Roy W. Tindula. *Foundry,* v. 80, Sept. 1952, p. 193-194, 196, 198, 201, 204, 207, 208.

History and present status of investment precision casting or lost-wax process. 73 ref. (E15)

567-E. Purdue University Converts to Modernized Foundry. James W. Mayer. *Foundry,* v. 80, Sept. 1952, p. 266, 268, 270.

Purpose of foundry program is to provide foundry experience for engineers, actual production of castings, and research. (E general, A9)

568-E. Methods Employed in the Production of Heavy Iron Castings. J. Richardson and C. F. Lawson. *Foundry Trade Journal,* v. 93, Aug. 14, 1952, p. 173-179; Aug. 21, 1952, p. 207-215; Aug. 28, 1952, p. 247-248.

A few examples of heavy castings, their main features and problems. Production methods and general principles applicable to a variety of castings. (E11, CI)

569-E. Insulating Feeders for Use With Copper-Alloy Sand Castings. R. A. Skinner and R. W. Ruddle. *Foundry Trade Journal,* v. 93, Aug. 14, 1952, p. 181-184; disc., p. 184-185.

Use of plaster sleeves to decrease the size of feeders and to increase yields. Diagrams and graphs. (E23, Cu)

570-E. Simple Mechanical Layout for the Jobbing Brass Foundry. F. C. Evans. *Foundry Trade Journal,* v. 93, Aug. 21, 1952, p. 201-203; disc., p. 203-205.

Plant has been operated with great success in a number of American brass foundries. How similar results can be obtained with standard British equipment. (E general, Cu)

571-E. Many Mechanisms at Work Producing Grain Refinement in Light Metals. Harold Bernstein. *Journal of Metals,* v. 4, Sept. 1952, p. 926-930.

Growth restriction theories, adsorption effect, surface tension, nucleation theories, nucleation by foreign particles, and effect of vibration. Tables, graphs, photographs illustrate results of study of Al, Cu, Ti, Zn. 15 ref. (E25, Al, Cu, Ti, Zn)

572-E. Foundry Practice at the Winget Meehanite Foundry. D. F. Knight. *Machinery Lloyd* (Overseas Ed.), v. 24, Aug. 16, 1952, p. 81, 83, 85-88.

Production of Meehanite castings from a few ounces up to 2½ tons at British foundry. (E11, CI)

573-E. A New Die Casting Machine. *Machinery Lloyd* (Overseas Ed.), v. 24, Aug. 16, 1952, p. 101, 103, 105-106.
The die-casting process, materials used, and difference between hot and cold-chamber working. A new self-contained semi-automatic die-casting machine. (E13)

574-E. Mechanized Production of Cast Iron Pipes. *Machinery* (London), v. 81, Aug. 21, 1952, p. 311-318.
New foundry of the Carron Co. Works, Falkirk, Scotland.
(E general, CI)

575-E. Pressure Die-Casting of Aluminium. (Concluded.) **Part VI. Selection of Die Steel. Part VII. Preparation of Die for Foundry. Part VIII. Ancillary Equipment.** H. J. Sharp. *Metal Industry,* v. 81, Aug. 8, 1952, p. 109-112; Aug. 15, 1952, p. 123-125.
(E13, Al)

576-E. Solidification of Steel. *Metal Progress,* v. 62, Sept. 1952, p. 172, 174, 176. (Condensed from "Solidification of Steel From Sand and Chill Walls", H. F. Bishop, F. A. Brandt, and W. S. Pellini, *Naval Research Laboratory,* Report 3785, Jan. 4, 1951).
See abstract based on *American Foundrymens Society,* Preprint 51-22, Apr. 1951, item 282-E, 1951.
(E25, N12, CI)

577-E. Synthetic Resins for the Foundry. *Plastics,* Aug. 1952, p. 231-232, 234.
Pros and cons in relation to core binding, dielectric drying techniques, shell-molding methods, etc. (E18)

578-E. Melting Metals in Space. *Westinghouse Engineer,* v. 12, Sept. 1952, p. 171-172.
See abstract of "Metals Melted Without Crucibles", E. K. Okress and D. N. Wroughton, *Iron Age,* item 495-E, 1952. (E10, Al, Ti, Ag, EG-d)

579-E. (French and German.) Light Metal Sand Castings. J. P. Meister. *Aluminium Suisse,* v. 2, July 1952, p. 136.
Advantages and range of application. (E11, T general, Al, Mg)

580-E. (German.) Application of the Jet Process for the Repair of Burnouts in Cupolas. Kurt Krämer and Otto Reinsberg. *Giesserei,* v. 39, July 24, 1952, p. 357-362.
The Torkret process. Types of materials used for the jets, and experiments with various semi-synthetic compounds. Economic advantages of the method. Tables, charts, and diagrams. (E10)

581-E. (German.) A New Foundry. K. Mallener and J. Stadler. *Giesserei,* v. 39, July 24, 1952, p. 362-366.
Improved layout and its advantages. Diagrams. (E general)

582-E. (German.) A Foundry With Coreless Line-Frequency Induction Crucible Furnaces for Melting of Magnesium Alloys. W. Zschintzsch. *Giesserei,* v. 39, Aug. 7, 1952, p. 381-387.
Installation developed in Germany after the war. Construction details and experiences. (E10, Mg)

583-E. (German.) The Application of Synthetic Sands, Including Cement Sands. E. Lange. *Giesserei,* v. 39, Aug. 7, 1952, p. 387-390.
Advantages and disadvantages of the use of exclusively synthetic sands in the foundry. Types of sand, effect of grain size, and water and cement content. Examples of practical application. Tables and graphs. (E18)

584-E. The Job Record Card, a Valuable Tool for the Jobbing Foundry. R. W. Griswold. *American Foundryman,* v. 22, Sept. 1952, p. 34-36.
System developed at Erie Malleable Iron Co., Erie, Pa. Furnishes enough data to prepare any job for production and run it the same way every time. (E general, A5)

585-E. Small Foundry, Small Castings. *American Foundryman,* v. 22, Sept. 1952, p. 37-39.
Plant of Goltra Foundries, Inc., Barrington, Ill., which specializes in small, precise castings. Layout diagram and photographs.
(E general, A5)

586-E. Foundry Crucible Service Life. R. A. Heindl. *American Foundryman,* v. 22, Sept. 1952, p. 40-43.
Relative merit of crucibles manufactured from Alabama, Pennsylvania, and Madagascar graphites. Bonding agents, flake size in crucible mixes, and mechanical properties. Tables and photographs.
(E10)

587-E. The Nonferrous Cleaning Room. Martin G. Dietl. *American Foundryman,* v. 22, Sept. 1952, p. 44-49.
See abstract from *Foundry;* item 322-E, 1952. (E24, Cu)

588-E. The Truth About Disease Caused by Foundry Dusts. O. A. Sander. *American Foundryman,* v. 22, Sept. 1952, p. 53-54.
(E general, A7)

589-E. Causes of Hot Tears in Steel. *American Foundryman,* v. 22, Sept. 1952, p. 59-62.
Discussion by seven Texas foundrymen on experiences with hot tears in steel castings. (E25, CI)

590-E. Design-Production Teamwork Is Key to Steel Foundry Gains. J. O. Felt. *American Foundryman,* v. 22, Sept. 1952, p. 65-67.
How castings can be improved through the use of cooperative de-

sign, and how jobs normally lost to the foundry can be captured. Illustrated examples of steel drive spacers for tractors, hydraulic cylinder heads, trailer axle, machinery hinge basket, and rockers and stop baskets for an end dump hopper. (E general, CI)

591-E. Melting Control by Cupola Pyrometer. R. I. Taylor. *Foundry Trade Journal,* v. 93, Aug. 28, 1952, p. 229-232.

Present methods of cupola control, based on use of volume and pressure meters, leave much to be desired. Use of a recording pyrometer. Diagram shows recommended pyrometer location. Typical chart records of temperature are presented and discussed. (E10, S16, CI)

592-E. Shell Molding. Roger W. Bolz. *Machine Design,* v. 24, Sept. 1952, p. 160-162.

Illustrated description. (E16)

593-E. Core Baking by High-Frequency Dielectric Heating. J. Meilink. 4th International Mechanical Engineering Congress, June 1952, 19 pages.

Use and advantages of thermosetting-resin binders. Influence of variables on core properties. Data on iron castings. Diagrams and graphs. (E21, CI)

594-E. Development of High-Duty Cast Iron; Austrian Activities. Roland Mitsche and Rolf Weinberger. 4th International Mechanical Congress, June 1952, 7 pages.

Reviews earlier development and summarizes research and development activities of the Austrian High Strength Cast Iron Committee. Diagrams show results of graphite modification by various methods. (E general, CI)

595-E. (German.) **New Results With Cement-Sand Casting.** M. Beilhack. *Giesserei,* v. 39, Aug. 21, 1952, p. 405-410.

Reviews various processes. Results with different types of cements, and with different cement and water content. Examples for a new process using fully synthetic, automatically hardening, plastic sand. Graphs and photographs. (E16, E18)

596-E. (Portuguese.) **Casting of Cylinder Blocks.** Lino A. de Lacerda Santos and Manoel A. Moraes. *Boletim da Associacao Brasileira de Metais,* v. 8, Jan. 1952, p. 5-19.

Possibility of casting in a horizontal position and using an ordinary molding machine for series production. Schematic drawings and tables. (E11, E19, CI)

597-E. (Russian.) **Remelting Cathode Zinc in Induction Furnaces With Steel Cores.** P. F. Sabaneev. *Promyshlennaia Energetika,* v. 9, Jan. 1952, p. 4-7.

Design and operation of furnaces for melting zinc. Diagrams. (E10, Zn)

598-E. (Swedish.) **Production and Productivity in the American and the Swedish Steel Casting Industries.** Stig H. Ljunggren. *Jernkontorets Annaler,* v. 136, No. 6, 1952, p. 131-155.

On the basis of available statistical data and a visit to a number of steel foundries in the U. S., an attempt is made to analyze the causes of the difference in productivity between the two countries. As representative figures for productivity, the author gives for the U. S. 96 and for Sweden 160 man-hours per metric ton of steel castings produced. About 1/3 of the difference is explained by more complete mechanization in American steel foundries and by other metallurgical factors. Another 1/3 is due to the fact that a considerable part of American steel castings are produced in large volume and machine molding is therefore widely used. Also the average size of American steel foundries is about six times that of Swedish. The last third of the difference is probably mainly explained by higher working intensity in American foundries. 14 ref. (E general, A5, CI)

599-E. (Book.) **The Art and Science of Founding.** N. L. Bush. 333 pages. Angus & Robertson, Ltd., London, England.

Written as a text for trade schools, technical colleges, and as a reference for metallurgists, engineers, and foundry workers. More useful for practical information than for technical phases. Mechanization and equipment are described in greater detail than commonly found. (From review in *American Foundryman.)* (E general)

600-E. (Book.) **Copper-Base Alloys Foundry Practices.** Ed. 2. 232 pages. 1952. American Foundrymen's Society, 616 S. Michigan Ave., Chicago 5, Ill.

Recommendations in general and for the various types are presented in comprehensive detail. Numerous tables, diagrams, and illustrations. (E general, Cu)

601-E. (Book.) **Symposium on Principles of Gating.** 95 pages. 1951. American Foundrymen's Society, 616 S. Michigan Ave., Chicago 5, Ill. $4.10.

Eleven papers presented at the 55th annual meeting of American Foundrymen's Society, Buffalo, N. Y., Apr. 24, 1951. Individual papers are separately abstracted. (E22)

602-E. (Book—German.) **Chemie in der Giesserei.** (Chemistry in the Foundry.) E. Wagner. 84 pages. 1952. Verein Deutscher Giesserei Fachleute, Dusseldorf, Germany. 3.60 DM.

Intended to make molders and coremakers understand the chemical facts that underlie their trade. Fundamental facts are explained in an easily understandable manner, although an expert chemist might take exception to some of the explanations. Should be of value to younger men and to instructors in apprentice courses. Whole field of chemistry, except physical chemistry, covered. —W. Trinks. (E general, P13)

603-E. (Book—German.) **Physik in der Giesserei.** (Physics in the Foundry.) L. Frede. 138 pages. 1952. Verein Deutscher Giesserei Fachleute, Dusseldorf, Germany. 6.80 DM.

Intended to make molders and coremakers understand the physical facts that underlie their trade. Fundamental facts are explained in an easily understandable manner, although an expert physicist might take exception to some of the explanations. Should be of value to younger men and to instructors in apprentice courses. The whole field of physics, except nuclear (atomic) physics, is covered.—W. Trinks. (E general, P general)

604-E. Impregnation Improves Casting Quality, Service Life. J. B. Cantwell. *Iron Age,* v. 170, Sept. 18, 1952, p. 166-167.

Methods used at Sealmore Corp., Muskegon, Mich. Air in voids is evaporated under high vacuum. The sealant, a mixture of 500-mesh metallic flour in sodium silicate, is introduced until castings are covered. Then 100-psi. air pressure is applied. (E25)

605-E. Discussion on "Some Experiments With Ductile Cast Iron". G. Singh. *Metallurgia,* v. 46, Aug. 1952, p. 93.

Discussion of the paper by C. C. Hodgson and C. S. Johnson (May 1952 issue, item 401-E, 1952). Experiences on slag removal after inoculating with Mg. Photomicrographs. (E25, Q general, G17, CI)

606-E. Rotary Melting Furnaces. *Metallurgia,* v. 46, Aug. 1952, p. 99-100.

Table contains operating results for steel, high-duty iron, malleable, Cu, gunmetal, and Al. Text information on cast iron and tin foil. (E10)

607-E. Special Mixture Overcomes Feeding Problem. *Canadian Metals,* v. 15, Sept. 1952, p. 30-32.

Casting method in which Feedex (mixture which when ignited reacts chemically to produce heat) is used to improve light alloy castings. (E23, Al)

608-E. Producing Constant Tolerance Drop Hammer Dies. Gilbert C. Close. *Finish,* v. 9, Oct. 1952, p. 21-24, 76.

Concurrent and cooperative research on above problem at Armour Research Foundation and at Northrop Aircraft Co. Kirksite die metal is used. Metal cooling methods, plaster-water ratio, casting technique, and other features of foundry practice. (E16, Zn)

609-E. Patternmaking Today. M. J. Kellner. *Foundry,* v. 80, Oct. 1952, p. 102, 203.

Patternmaking for Al, cast iron, steel, brass, Mg, and white metal. Construction and welded parts. (E17, Al, CI, ST, Cu, Mg, Sn)

610-E. What Causes Molding Green Strength? Clyde A. Sanders. *Foundry,* v. 80, Oct. 1952, p. 108-109, 283-286.

Seven theories to explain plasticity and strength of bonding sands. (E18)

611-E. Modern Facilities Incorporated in New Alabama Pipe Foundry. William G. Gude. *Foundry,* v. 80, Oct. 1952, p. 110-113, 240.

Foundry procedure for manufacturing cast iron pipe. (E11, F26, CI)

612-E. Research Contributions to the Foundry Industry. G. A. Lillieqvist. *Foundry,* v. 80, Oct. 1952, p. 114-119, 258, 260-262, 264.

See abstract of "Role of the Research Foundry Unit", *Foundry Trade Journal,* item 537-E, 1952. (E general, A9, CI)

613-E. How to Develop Cast Products. R. J. Franck. *Foundry,* v. 80, Oct. 1952, p. 120-123, 205.

A practical method of product design that may be adopted by any foundry product-development department. It can operate at minimum cost for production of best possible product in a minimum length of time. Includes description of experimental stress-analysis setup. (E general, Q25)

614-E. Chemical and Physical Changes in Magnesium-Treated Irons. Masazo Okamoto and Renpei Yoda. *Foundry,* v. 80, Oct. 1952, p. 126-127.

Study made by varying the holding time before pouring, as well as by addition of chlorides, fluorides and oxides. Micrographs and graphs. (E25, CI)

615-E. Effect of Raw Materials on Cupola Operation. Bernard P. Mulcahy. *Foundry,* v. 80, Aug. 1952, p. 146, 148, 153; Oct. 1952, p. 206, 208-209, 211.

Fifth article of a series discusses some of the coke properties which were shown to affect operations to a noticeable extent. Sixth article deals with use of beehive coke and anthracite coal. (E10, B18, CI)

616-E. How to Make A Mold for a Pulley Casting. Pat Dwyer. *Foundry,* v. 80, Sept. 1952, p. 223-224, 226, 228; Oct. 1952, p. 229-230, 232-234.

Extensive description. Diagrams. (E19, CI)

617-E. Production of Manganese-Steel Castings. F. Cousans and W. C. Meredith. *Foundry Trade Journal,* v. 93, Sept. 11, 1952, p. 287-293.

History of Mn-steel, early production methods, typical designs of castings, and present-day foundry methods. Molding materials and washes, feeding heads, pouring, knocking out, and quenching. Mold layouts of examples of important castings. Diagrams and photographs. (E11, ST, Mn)

618-E. Productivity in the Coreshop Increased by Using Coreblowers and Synthetic Resins. P. G. Pentz. *Foundry Trade Journal,* v. 93, Sept. 11, 1952, p. 295-298; disc., p. 299-300.

Bronze foundry practice, including resins available, effect of clay, stripping, potential economies, obstacles, rates of production, and advantages of core-blowing. (E21, Cu)

619-E. Ingot-Mould Production by Sandslinger. *Foundry Trade Journal,* v. 93, Sept. 11, 1952, p. 301-304.

Discussion with author participation of "Production of Ingot Moulds by Sandslinger in a Mechanized Foundry", by J. Raymond Jones, in *Foundry Trade Journal;* see item 532-E, 1952. (E11, CI)

620-E. Sand-Cast Beryllium-Bronze. L. Grand. *Foundry Trade Journal,* v. 93, Sept. 18, 1952, p. 317-324; disc., p. 324-325.

Previously abstracted from *Metal Industry;* see item 443-E, 1952. (E11, Q general, Cu, Be)

621-E. Pattern Production Methods. F. H. Wakeham. *Foundry Trade Journal,* v. 93, Sept. 18, 1952, p. 331-332.

Problems of a pump valve-box and branch pipe. Diagrams. (E17)

622-E. Gas Content Control. *Light Metals,* v. 15, Sept. 1952, p. 306-307.

Apparatus by which gas porosity of Al-base alloys in particular is lessened by degassing. Photographs and tables. (E25, Al)

623-E. Casting Developments. A. Dunlop. *Metal Industry,* v. 81, Sept. 5, 1952, p. 183-185; Sept. 12, 1952, p. 206-207.

A review of processes giving greater precision. Basically, all are investment techniques. (E15)

624-E. Shell Molding: New Machine Makes It Automatic. *Steel,* v. 131, Oct. 6, 1952, p. 83-84, 86.

Equipment developed by Powdered Metal Products which can turn out 20 complete shells from a single set of dies. Advantages and outline of the operation. (E16)

625-E. The Influence of Primary Particles on the Grain Size of Cast Magnesium-Aluminium Alloys. W. A. Baker, Myriam D. Eborall, and A. Cibula. *Journal of the Institute of Metals,* v. 81, Sept. 1952, p. 43-47.

Experimental data determining the similarity between the superheating and carbon process for grain refinement of Mg-Al alloys and whether or not a nucleating substance was responsible for both, or either, of them. Two types of primary particle were found, one in Fe-rich phase, and other of unknown identity. Photomicrographs. 14 ref. (E25, M27, Mg)

626-E. Shell Molding. *Product Engineering,* v. 23, Oct. 1952, p. 121-127.

Mechanization, controlling factors, castable metals, and pattern materials. Fundamental steps of manual and automatic shell molding. Diagram and photographs. (E16)

627-E. Creating a Thimble. *Steel,* v. 131, Oct. 20, 1952, p. 90-91.

Operations involved in making cinder pots at Midland, Pa., plant of Mackintoch-Hemphill Co. Production consists of a series of specialized foundry operations beginning with a full-size, solid, wooden pattern. (E11, CI)

628-E. (Book.) **Foundry Sand Handbook.** Ed. 6. 265 pages. 1952. American Foundrymen's Society, 616 S. Michigan Ave., Chicago 5, Ill. $5.25.

Mode of occurrence of sands and clays; methods for sampling foundry sands and clays; preparing foundry sand mixtures for testing; methods for determining fineness; determining moisture content; determination of permeability; strength of foundry sand mixtures; method for determination of green surface hardness; determining sintering point; elevated temperature tests; chemical analysis; tentative method for testing core binders; mechanical properties of core-sand mixtures; method for determining strength of core paste; nonstandard tests; interpretation of room-temperature sand tests; maintenance of testing equipment; molding-sand mixtures for ferrous and nonferrous metals. (E18)

629-E. Effect of Oxidation Rates on Graphitization of Cupola-Melted Malleable. Milton Tilley. *American Foundryman,* v. 22, Oct. 1952, p. 46-47.

An investigation of cupola metal.

as it is melted, before being mixed and further refined in the holding furnace by pouring samples at the cupola spout. Photomicrographs. (E25, CI)

630-E. How the One-to-Ten Ram Test Measures Sand and Mold Properties. Clyde A. Sanders and Arthur G. Clem. *American Foundryman,* v. 22, Oct. 1952, p. 48-50.

Describes method. Typical results charted. (E18)

631-E. Cupola Deoxidation Improves Iron Casting Machinability. F. S. Kleeman. *American Foundryman,* v. 22, Oct. 1952, p. 61-66.

Process which involves use of a briquetted deoxidizer to increase machinability. This makes it possible to increase machining production with present facilities. Photomicrographs show comparative structures. Machining test data are tabulated and charted. (E10, G17, CI)

632-E. (French.) **The Behavior of Cores During Casting.** Pierre Nicolas. *Fonderie,* Aug. 1952, p. 3043-3059.

Respect to soaking, untamping, and gases freed by the cores during casting. Schematic drawings, graphs, and photographs. (E21)

633-E. (French.) **Normal Technical Possibilities of Pressure Casting.** R. Grunberg. *Métallurgie et la Construction Mécanique,* v. 84, July 1952, p. 499, 501, 503; Aug. 1952, p. 561, 563.

Metal properties and forms which must be present if pressure casting is to be applied on the basis of available data. Tables contain French and foreign specifications for Zn, Al, and Mg alloys. Graphs. (E13, Al, Zn, Mg)

634-E. (French.) **Impregnation of Unquenched Castings.** Henry Garnier. *Revue de l'Aluminium,* v. 29, Sept. 1952, p. 323-326.

In light-alloy castings that are otherwise satisfactory, porosity can be eliminated by using fillers. Pressure or vacuum is used to increase penetration of sodium silicate, drying oils, synthetic resins, or varnishes. Schematic diagram of equipment. (E25, Al, Mg)

635-E. (German.) **Notes on the Evolution of Carbon Monoxide Upon Passage of Carbon Dioxide Over Incandescent Coke.** G. Clas and E. Djernaes. *Giesserei,* v. 39, Sept. 18, 1952, p. 473-477.

Combustion processes in the cupola furnace and significance of the Boudouard equilibrium in cupola operation. Test procedure and results. Graphs and diagrams. 12 ref. (E10, CI)

636-E. (German.) **Behavior of Different Chill Materials During Production of Steel Castings.** E. Lanzendörfer. *Giesserei,* v. 39, Sept. 18, 1952, p. 483-486.

The following materials were investigated: ordinary bessemer steel; bessemer steel containing 0.29% Al; ordinary desiliconized openhearth steel; and openhearth steel containing 0.26% Si. Macrographs and micrographs illustrate structures of the castings obtained. (E23, E25, CI)

637-E. (German.) **Purification of Aluminum Melts With Chlorine Gas in the Foundry.** W. Büchen. *Giesserei,* v. 39, Sept. 18, 1952, p. 491-498.

Impurities likely to be present, physicochemical processes occurring during chlorine treatment, equipment, melting furnaces, heat balances, safety precautions, and testing. (E25, Al)

638-E. (Russian.) **The Cooling of Castings.** A. I. Veinik. *Doklady Akademii Nauk SSSR,* new ser., v. 85, July 21, 1951, p. 559-562.

The mechanics and thermodynamics of the cooling of castings, particularly in metallic molds. (E25, P12)

639-E. (Swedish.) **Nomenclature for Gating Systems.** *Gjuteriet,* v. 42, Sept. 1952, p. 139-144.

A tentative Swedish nomenclature for gating systems for steel, iron and nonferrous metals. The terms suggested are described in 22 figures, and put together in a table with translations into French, German, and English. (E22)

640-E. Balanced Blast Cupola Boosts Iron-Coke Ratio, Offers Other Advantages. Norman Bennett. *Canadian Metals,* v. 15, Oct. 1952, p. 56, 58.

Special arrangement of tuyeres which improves efficiency of combustion in melting gray iron. (E10, CI)

641-E. Centrifugally Cast Stainless Steel Rings. C. V. Hotson. *Canadian Metals,* v. 15, Oct. 1952, p. 62-64.

Canadian process which results in less expensive and quicker operation, and castings of greater density and higher quality with fewer inclusions. (E14, SS)

642-E. Strain Theory of Hot Tearing. William S. Pellini. *Foundry,* v. 80, Nov. 1952, p. 124-133, 192, 194, 196, 199.

Investigations at the Naval Research Laboratory demonstrated that hot tearing actually represents fracture through liquid films which exist at near-solidus temperatures. Diagrams, photographs, micrographs, and graphs show results for vari-

ous ferrous and nonferrous metals and alloys. (E25, Q26)

643-E. Effect of Raw Materials on Cupola Operation. Bernard P. Mulcahy. *Foundry,* v. 80, Nov. 1952, p. 236, 238.

Seventh of series. Types of cupola fluxes, their function in obtaining clean metal, and how to judge efficiency of slag during melting. (E10, CI)

644-E. Titanium Casting Research Tests Shell Molded Refractories. J. G. Kura. *Iron Age,* v. 170, Oct. 30, 1952, p. 88-92.

Experiments in which various materials were tested for construction of satisfactory shell molds for Ti. Results and contamination measurements. Tables, diagrams, photographs, and micrographs. (E19, Ti)

645-E. (French.) Elimination of Aluminum Present in Bronze. Georges Blanc and Pierre-Julien le Thomas. *Fonderie,* Sept. 1952, p. 3091-3106.

A comprehensive report. Experimental results are tabulated and charted. (E25, Cu)

646-E. (German.) Bentonite as a Molding-Sand Binder. Otto Eckart. *Giesserei,* v. 39, Oct. 2, 1952, p. 529-533.

Properties of bentonite, the reasons for the binding strength of this mineral in green and dry sand molds. Tables, diagrams, and graphs. 12 ref. (E18)

647-E. (German.) Electrical Heating of Gates for Heavy Steel Castings. W. Rietzscher. *Giesserei,* v. 39, Oct. 16, 1952, p. 553-558.

Amount of piping, rate of solidification, required gate sizes, and necessary electrical energy. Ways of combating the undesirable effects of segregation. Data are graphed. (E22, CI)

648-E. The Influence of the Sulphur-Manganese Ratio on the Occurrence of Mottle in Whiteheart Malleble Iron. S. W. Palmer. *British Cast Iron Research Association Journal of Research and Development,* v. 4, Oct. 1952, p. 394-402.

Experimental data and results. Tables, graphs, and macrographs. (E25, M27, CI)

649-E. A Study of Some Metallurgical Factors Influencing Chill and Mottle Formation in Cast Iron. W. J. Williams. *British Cast Iron Research Association Journal of Research and Development,* v. 4, Oct. 1952, p. 403-423.

Effect of superheating, inoculation, melting stock, and the possible effect of oxygen, on the chilling properties of low-Si cast irons. Results are correlated with existing information and theories on the effects of superheating and inoculation on chill formation. Tables and macrographs. (E25, CI)

650-E. Light Alloys' Modern Foundry. *Canadian Metals,* v. 15, Oct. 1952, p. 52-54.

Plant layout of Dominion Magnesium, Ltd., foundry at Halev, Ontario, where turbine engines for jet aircraft are manufactured. (E11, Mg)

651-E. Permanent Ceramic Moulds for Non-Ferrous Casting. D. E. Hope. *Foundry Trade Journal,* v. 93, Oct. 30, 1952, p. 503-504.

Process developed for producing small nonferrous castings repetitively with a finish similar to die castings, but at a lower cost than that which embodies preparation of a metal die. (E19, EG-a)

652-E. Internal Stress in Castings. *Foundry Trade Journal,* v. 93, Oct. 30, 1952, p. 505-509.

Discussion of report of Subcommittee T.S.32, (Oct. 23 issue.) Light alloys, pouring temperatures, cooling methods, and effects of mold materials. Examples of conditions of internal stress in particular castings, and additional work on high-temperature effects. A theory to explain delayed cracking. (E25, Q25)

653-E. Sand-Cast Beryllium-Bronze. *Foundry Trade Journal,* v. 93, Oct. 30, 1952, p. 511-514.

Further discussion of paper by L. Grand. (Sept. 18 issue.) Includes additional photomicrographs. See item 620-E, 1952. (E11, Q general, Cu, Be)

654-E. The British Cast Iron Research Association. J. G. Pearce. *Metallurgia,* v. 46, Oct. 1952, p. 193-194.

Various aspects of work done at this organization. Gases in cast iron, properties of molding sands, working conditions in foundries, and analysis of cast iron by means of the direct-reading spectrograph. (E general, A9, CI)

655-E. Beryllium Copper Molds. G. G. M. Carr-Harris. *Technical Information Service, National Research Council* (Canada), Report 23, Nov. 1951, 5 pages.

Comments taken from various references on the above. 12 ref. (E19, Cu)

656-E. The Casting Of Metals in Permanent Molds. G. G. M. Carr-Harris. *Technical Information Service, Na-*

tional Research Council (Canada), Report 3, July 1950, 13 pages.
48 references. (E12)

657-E. Impregnation of Metal Castings. G. G. M. Carr-Harris. *Technical Information Service, National Research Council* (Canada), Report 24, Nov. 1951, 5 pages.

In order to secure pressure tightness, the use of a sealant is sometimes justified. Some of the procedures used. 22 ref. (E25)

SECTION F

PRIMARY MECHANICAL WORKING

1-F. Rolls and Rolling. Part XXX. Tees. E. E. Brayshaw. *Blast Furnace and Steel Plant,* v. 39, Nov. 1951, p. 1354-1357.

Roll-pass diagrams. (F23)

2-F. New Rolling Method Eliminates Surface Defects. Norman C. Rendieman. *Iron Age,* v. 168, Nov. 15, 1951, p. 122-124.

How diamond and square rolling are used to eliminate deep seams, spongy surfaces, and other defects in semifinished products on secondary mills. Scarfing and chipping to remove defects are not necessary to produce a good product, even in the difficult bessemer grades, when using this rolling method. (F23, ST)

3-F. Application of Precast Insulation to Water-Cooled Supports in Underfired Furnaces. James E. Hovis. *Iron and Steel Engineer,* v. 28, Nov. 1951, p. 69-72; disc., p. 72.

How precast insulation can result in fuel savings up to 20% and increase production as much as 10%. Refers to furnaces used to heat steel prior to rolling. (F21)

4-F. Instrumentation for Improved Rolling Temperature Control. L. D. Culp. *Iron and Steel Engineer,* v. 28, Nov. 1951, p. 85-90; disc., p. 90-91.

The important part that temperature plays in the rolling of quality steel product. Instrumentation that is available for measuring, indicating, and recording these temperatures. (F23, S16, ST)

5-F. Magnetic Amplifier Control for Rolling Mills. *Iron and Steel Engineer,* v. 28, Nov. 1951, p. 112, 114, 118, 120.

A pilot-plant demonstration showing the possibilities of magnetic amplifier control. (F23, S18)

6-F. New Heavy Forge at Hadfields Ltd. *Metal Industry,* v. 79, Nov. 9, 1951, p. 395-398.

Forging presses and furnaces. (F22)

7-F. On Plastic Deformation Process of Compression of Metals Under High Speed. Hiroshi Yamanouchi and Yuji Matsuura. *Reports of the Casting Research Laboratory,* No. 2, 1951, p. 7-10.

Measurements were made of hammer movements in forging of Pb. Compressive displacement-time curves were mathematically analyzed and fundamental relations between the resistance to deformation, deformation speed corresponding to work done, and deformed shapes of the test pieces were analyzed. (F22, Q23, Pb)

8-F. British Experience With the Counterblow Forging Hammer. Paul Granby. *Steel Processing,* v. 37, Nov. 1951, p. 562-566, 585.

(F22, ST)

9-F. Rare Earths Improve Forgeability of Stainless. E. B. Post, D. G. Schoffstall, and H. O. Beaver. *Iron Age,* v. 168, Dec. 6, 1951, p. 162-163.

Use of the rare-earth elements to improve the hot workability of austenitic Cr-Ni and high-alloy stainless steels. Effect is exceptionally marked in some alloys where the metal is converted into a commercial wrought product from a metal previously considered to be non-hot workable. In other metals, the effect is to improve existing hot workability as evidenced by better ingot-to-billet yields, less billet preparation, and better hot rolled strip surfaces. (F22, F23, SS, EG-g)

10-F. Hot and Cold Forging Methods. C. W. Hinman. *Modern Machine Shop,* v. 24, Dec. 1951, p. 132-134, 136, 138, 140, 142.

First of a series of articles which will deal with equipment and methods. (F22)

11-F. The Heating of Rounds for Piercing. W. Trinks. *Industrial Heating,* v. 18, Nov. 1951, p. 2023-2024, 2026, 2028, 2030, 2032, 2034, 2036.

"Piercing" refers to the cross-rolling process in which an internally weakened round bar with a partially disintegrated center is forced over a piercer-point. The process is known as the Mannesmann process. Furnaces are described and schematically diagrammed. (F21)

12-F. Cerium and Lanthanum Improve Hot Workability of Stainless. C. B. Post, D. G. Schoffstall, and H. O. Beaver. *Steel,* v. 129, Dec. 10, 1951, p. 88-91.

Alloy additions of Ce and La in the range 0.08-0.18% were found to improve hot workability of Ni-Cr-Mo-Cu and other high-alloy stainless steels. (F22, SS, SG-g-h)

13-F. Use Glass As Heat Source in Metal Processing. *Ceramic Industry,* v. 57, Dec. 1951, p. 83-84.

The principles of using molten glass, melted and kept molten electrically, as a source of heat for furnaces where high temperatures are required. Method is said to be practical for annealing strip, heating ingots and cold billets, if power cost is low. (F21, J23)

14-F. Electroweld Tube Mill Rolls High Speed Quality Mill Product. *Steel Equipment & Maintenance News,* v. 4, Nov. 1951, p. 15.

In one continuous, automatic operation, the AEF tube mill converts steel strip into welded tubing. (F26, ST)

15-F. Presses for the Jet Age. *Fortune,* v. 44, Dec. 1951, p. 110-113, 146, 148.

The role of closed-die forging presses of the size 25,000 to 50,000 tons in the production of modern planes. U. S. deficiency in forging and extrusion presses. (F22, F24, G1)

16-F. Heavy Forge Shop at Hadfields Limited, Sheffield. *Engineering,* v. 172, Nov. 16, 1951, p. 616-619. (F22)

17-F. French Sheet Steel. *Iron and Steel,* v. 24, Nov. 1951, p. 500.

French continuous cold rolling mill for the production of thin sheet. Pickling and tempering operations are stressed. (F23, L12, J29, ST)

18-F. Cooling Beds for Bar Mills. W. Udall. *Journal of the Iron and Steel Institute,* v. 169, Nov. 1951, p. 257-276.

Evolution of the merchant bar mill during the last 50 years. Several of the earlier and later types of cooling bed and bed mechanisms and various factors governing their location and operation. Theoretical and practical observations relating to thermal treatment and cooling capacity. Suggestions regarding possible future developments. (F23, ST)

19-F. Induction Heating in the Drop-Forging Industry. G. W. Seulen. *Metal Treatment and Drop Forging,* v. 18, Nov. 1951, p. 483-489.

Various induction heating units for use in forging; their advantages and disadvantages. (F21, F22)

20-F. New Plant for the Production of Heavy Steel Forgings; Developments at Hadfields Limited. *Metallurgia,* v. 44, Oct. 1951, p. 245-252.

Salient features of the Hatfields Ltd., plant, including reheating, forging, and heat treatment facilities. (F22, ST)

21-F. Copper and Brass Tubes. Leonard F. White. *Australasian Engineer,* Oct. 8, 1951, p. 65-69.

A summary of the principal uses of copper and brass tubes and the most commonly used alloys. A general account of the most important methods of manufacture. (F26, Cu)

22-F. Contribution to the Problem of Cracking During Size Reduction of Steel Wire. (In German.) Wilhelm Püngel. *Stahl und Eisen,* v. 71, Oct. 25, 1951, p. 1137-1140.

Cracking of wire during hammer-mill reduction. Effect of rotation rate of the hammers on twisting of the cores of the wires was determined. Means of avoiding this type of failure. (F28, ST)

23-F. Temperature Measurement by Means of a Wire-Die Thermocouple During Wire Drawing. (In German.) Werner Lueg. *Stahl und Eisen,* v. 71, Oct. 25, 1951, p. 1140-1145; disc., p. 1145-1147.

Describes and diagrams apparatus. Patented steel wire was studied. Effect of reduction rate, sequence of drawing operations, friction due to springiness, die bearing length, plastic properties, strain hardening, drawing speed and lubricant, and wire quality were determined. (F28, S16, ST)

24-F. Shaping and Measurement of Die Contour. (In German.) Viktor Domes. *Stahl und Eisen,* v. 71, Oct. 25, 1951, p. 1147-1148.

Refers to wire-drawing dies. Diagrams show the principles of various methods for study of die contour. 11 ref. (F28)

25-F. Drawing Capacity and Output Requirements of the Multiple Two-Bar Drawing Process. (In German.) Anton Mackert. *Stahl und Eisen,* v. 71, Oct. 25, 1951, p. 1156-1160; disc., p. 1160-1161.

Reconstruction of a 40-ton drawbench for 2-bar drawing. Details of operating procedures. Power input was investigated for three speed

ranges in single and 2-bar drawing of different steels. (F27, ST)

26-F. Critical Analysis of Various Theories of Rolling. (In Polish.) Z. Wusatowski. *Prace Glownego Instytutu Metalurgii*, v. 3, no. 5, 1951, p. 389-416.

Reviews recent theories of the rolling process. Friction during the rolling process. The theories of Nadai, Celikoff, and Orowan. The theory of Orowan is analyzed on the basis of published reports. 27 ref. (F23)

27-F. (Book) **The Seamless Story.** J. Perc Boore. 285 pages. Commonwealth Press, Inc., 1507 De Long St., Los Angeles 15, Calif. $5.75.

Story of the Mannesmann and Stiefel piercing patent in Germany. History of the seamless steel tube industry in the United States, including the story of Shelby Steel Tube Co. and the individual tube companies that Shelby absorbed. Brief history of contemporary mills, as well as biographical sketches of important personalities in the industry. (F26)

28-F. Effect of Track Time on Soaking Pit Heating. J. R. Chegwidden. *Iron and Steel Engineer*, v. 28, Dec. 1951, p. 53-57; disc., 57-58.

Through the medium of an analysis of those operations included in the measurement of track time, suggests possible ways of improvement and a more accurate means of evaluation. (F21, ST)

29-F. New Slab Shear at Rotary Electric Steel Co. E. T. Peterson. *Iron and Steel Engineer*, v. 28, Dec. 1951, p. 59-64; disc., p. 64-65.

New shear gives positive control of the slab, eliminates depressing table and shock on shear table, and features quick release of the sheared-off portion of the slab. (F29, ST)

30-F. Recent Lubricating Problems at Sparrows Point. A. E. Cichelli. *Iron and Steel Engineer*, v. 28, Dec. 1951, p. 110-120, 122; disc., p. 122.

Improved design of machine parts so that lubricants would be more effective. Some specific problems in which lubrication of machinery in rolling mills was involved. (F23)

31-F. Coating Improves Forming Operations. *Iron and Steel Engineer*, v. 28, Dec. 1951, p. 127, 129.

Tells how "Granodraw", a phosphate coating, makes possible the cold extrusion of steel. By phosphate coating steel prior to working it, drawing, extrusion and other forming operations are improved. (F1, G21, ST)

32-F. Keeping Kilowatts in Line. C. C. Roberts. *Instrumentation*, v. 5, 4th qtr., 1951, p. 22-23.

Closely controlled forging operations at Locke, Inc., Baltimore, Md., give improved grain structure and less decarburization in steel parts. Instrumentation and control systems. (F22, S18, ST)

33-F. Principles of Continuous Gauge Control in Sheet and Strip Rolling. W. C. F. Hessenberg and R. B. Sims. *Sheet Metal Industries*, v. 28, Dec. 1951, p. 1083-1090.

The mechanism by which longitudinal gage variations are produced and how they may be corrected. Two novel methods of gage control. (F23, S14)

34-F. New Heavy Forge; Opening of Large Plant at East Hecla Works. *Iron and Steel*, v. 25, Dec. 1951, p. 534-537, 559-562.

General layout. Includes heat treatment facilities. Detailed account of the furnaces. (F22, ST)

35-F. Surface Treatment for Cold Extrusion. Adolph Bregman. *Metal Progress*, v. 60, Dec. 1951, p. 76-79.

The cold extrusion process for carbon steel developed in Germany during the last war. Lubricants and phosphate coatings applied to facilitate the process. (F1, F24, CN)

36-F. Track Time and Soaking Pit Practice. *Metal Progress*, v. 60, Dec. 1951, p. 124, 128, 146, 148. (Condensed from "Steel Quality as Affected by Track Time and Soaking Pit Practice." A. F. Mohri.)

Previously abstracted from *American Iron and Steel Institute*, Preprint, 1951. See item 153-F, 1951. (F21, ST)

37-F. Forum on Technical Progress: Processing Methods. *Steel*, v. 130, Jan. 7, 1952, p. 287-290, 292, 295, 296, 298, 301-302, 304, 307, 308, 310, 313, 316, 321-322, 325, 328, 330, 332, 334, 338, 340, 342, 344, 347, 350, 352, 355-356, 359, 362, 364, 366, 369, 372, 374, 376.

Brief discussions by men from industry on the present situation and anticipations for 1952. Includes foundry practice, primary and secondary fabrication, and heat treating.
(E general, F general, G general, J general)

38-F. Wire Drawing Technique and Equipment. Parts I-III. F. T. Cleaver and H. J. Miller. *Wire Industry*, v. 18, Oct. 1951, p. 893-896; Nov. 1951, p. 959, 961, 963-964; Dec. 1951, p. 1071-1073.

Part I: History and present-day practice. Diagrams and illustrations. Part II: Die materials, their maintenance and performance. Part III: Fabrication practice for Cu and other metals. Development trends. (F28)

39-F. Hadfields' New Forge: Technical Description of Plant and Equipment. *British Steelmaker,* v. 17, Dec. 1951, p. 632-636, 639-642, 645-646.

A comprehensive technical description of plant and equipment of British firm. (F22, ST)

40-F. Factors Responsible for Thickness Variations During Rolling of Sheet or Strip. (In Polish.) Zygmunt Wusatowski. *Hutnik,* v. 17, Nov.-Dec. 1950, p. 415-423.

Includes roll-pass diagrams and calculations. Factors involved, including temperature, roll-finishing operations, roll pressure, etc. 14 ref. (F23)

41-F. How to Use Copper Alloys in Forgings and Extrusions. L. F. Spencer. *Iron Age,* v. 168, Dec. 27, 1951, p. 66-69.

An evaluation of the use of Cu alloy forgings and extrusions. Data on mechanical properties of various types are tabulated. (F22, F24, Q general, Cu)

42-F. Hot and Cold Forging Methods. C. W. Hinman. *Modern Machine Shop,* v. 24, Jan. 1952, p. 140-142, 144, 146.

Equipment and methods. (F22)

43-F. Forging Magnesium. C. J. Orciuch. *Modern Metals,* v. 7, Dec. 1951, p. 54-55.

Typical forgings from the most widely used Mg alloys. (F22, Mg)

44-F. Extrusion Plus Forging Simplifies Aluminum Forming. G. W. Birdsall. *Steel,* v. 130, Jan. 14, 1952, p. 54-56.

New concepts in design and production methods for Al parts. Unique combination of extrusion and forging methods reduces metal waste 98.6%, and cuts machining 84%. Diagrams. (F22, F24, Al)

45-F. An Examination of Modern Theories of Rolling in the Light of Rolling Mill Practice. III. The Speed Effect in Strip Rolling, Gauge Control. (Continued.) N. H. Polakowski. *Sheet Metal Industries,* v. 28, Nov. 1951, p. 981-986, 992, Dec. 1951, p. 1077-1081.

Includes graphs and diagrams. (To be continued.) (F23)

46-F. Planning the Air Force Heavy Press Program; Larger Forgings Aid Aircraft Production. K. B. Wolfe. *Steel Processing,* v. 37, Nov. 1951, p. 551-554; Dec. 1951, p. 610-613.

The need for and the development to date of large horizontal extrusion machines and vertical presses. Comparison with Russia's advancement in this field. (F22)

47-F. An Investigation of Shell Forging Methods. W. Trinks. *Steel Processing,* v. 37, Dec. 1951, p. 603-609.

In each step in the hot forging of shells, from billet separation to nosing, many small details must be observed if acceptable forgings are to be made at low cost. Advantages of the cold forging method. (F22, ST)

48-F. The Fabrication of Copper Wire. Sidney Rolle. *Wire and Wire Products,* v. 27, Jan. 1952, p. 35, 37-47, 76-83.

A chronological development of the use of Cu. Surveys various stages in the production of Cu wire, including ore concentration, smelting, refining, rod rolling, pickling, annealing, butt welding, and wire drawing. Numerous diagrams. Three-page bibliography. (F28, Cu)

49-F. Rolling Characteristics of Various Steels. Edgar M. D. Herold. *Iron and Steel Engineer,* v. 29, Jan. 1952, p. 55-59; disc. p. 60-61.

Effects of alloying elements. Includes diagrams and tabulated data. (F23, Q general, AY)

50-F. End-Welded Collar Studs Increase Reheat Furnace Availability. Robert C. Singleton. *Iron and Steel Engineer,* v. 29, Jan. 1952, p. 152, 154, 157.

Advantages of insulating skid tubes and upright pipes in slab and billet reheating furnaces. (F21, K general)

51-F. Locked-Coil Rope Production. *Wire Industry,* v. 19, Jan. 1952, p. 63, 65.

Processes involved. (F28, G6, ST)

52-F. Mill Will Speed Tapered Sheets. A. H. Langenheim. *Aviation Week,* v. 56, Feb. 4, 1952, p. 47-48.

A new rolling mill which will mass-produce sheets up to 10 ft. wide for aircraft use, and cut time and chip wastage in slab milling. Application to Al alloys. (F23, Al)

53-F. Electrical Developments in 1951. W. H. Poole. *Blast Furnace and Steel Plant,* v. 40, Jan. 1952, p. 58-63.

Developments applied to various types of rolling mills for steel. (F23, ST)

54-F. Rolls and Rolling. Part XXXI. Rails. E. E. Brayshaw. *Blast Furnace and Steel Plant,* v. 40, Jan. 1952, p. 82-88.

Roll-pass diagrams and detailed textual explanations. (F23)

55-F. How Bridgeport Brass Solved the Problem of Limited Room in the Vertical Plane. W. J. Krailing. *Industrial Gas,* v. 30, Jan. 1952, p. 16-17, 23-25.

Ground floor had working overhead space of only 12 ft., to be used for nonferrous wire and rod drawing operations and heat treating for

finish annealing. Ingenious "pan-pull" furnace provided the answer. (F28, J23, Cu)

56-F. Develop New Forging Techniques for Aircraft Parts. G. W. Papen and W. Schroeder. *Iron Age,* v. 169, Feb. 7, 1952, p. 135-138.

Techniques studied for forging of Al and Mg alloy aircraft outer skin panels. Parts are thin, and have integral stiffening ribs. Forgings with webs thinner than 0.1 in. have been made with draft angles as low as 1°. Areas of forgings are much larger than conventional practice would indicate the press could handle. (F22, Al, Mg)

57-F. Rotating Hearth Reheating Furnace. *Metal Treatment and Drop Forging,* v. 19, Jan. 1952, p. 12.

Furnace developed by the French firm of Stein-et-Roubaix. Applicable to shapes (such as round billets for tubemaking) which cannot conveniently be reheated in a continuous pusher-type furnace. (F21)

58-F. Small Drop Forgings. H. A. Whiteley. *Metal Treatment and Drop Forging,* v. 19, Jan. 1952, p. 20-26.

The technique involved and the various important factors influencing the quality of the products. Preparation of dies and their heat treatment, and the design of clipping tools. Some typical small forgings are illustrated. (F22, ST)

59-F. Furnace Practice and Design. K. F. Bray. *Metal Treatment and Drop Forging,* v. 19, Jan. 1952, p. 33-34; disc., p. 34.

Furnace practice and design in representative forging plants. (F22)

60-F. What's Happening In The Forging Industry? John C. McComb. *Steel Processing,* v. 38, Jan. 1952, p. 20-21.

General discussion and table showing shipments of steel forgings in net tons for last 5 yrs. (F22, A4, ST)

61-F. Fabrication of Duralumin Strip of Various Thicknesses. (In French.) *Revue de l'Aluminium,* v. 28, Nov. 1951, p. 396.

French equipment which can manufacture strips up to 32 ft. long with a thickness from 0.709 to 0.031 in. (F23, Al)

62-F. Recent Trends Toward Production of Large Forgings. (In Spanish.) J. A. Sanderson. *Instituto del Hierro y del Acero,* v. 4, Jan.-Mar. 1951, p. 80-84. (Condensed from *Journées de la Grosse Forge.)*

Quality, size, and weight. Includes table showing size of equipment available at various locations in Russia, Japan, Italy, Czechoslovakia, Germany, Great Britain, France, and the U. S. (F22, ST)

63-F. Experiments on Weldability of a Cr-Ni-Mo Steel Containing "Bright Spots" (Flakes). (In Spanish.) Rafael Cabezudo Sanchez. *Instituto del Hierro y del Acero,* v. 4, July-Sept. 1951, p. 189-196.

Experiments show that flakes in above steel (low-alloy) can be eliminated by forging with reductions of 3.5-4 times, even when cooling is done in the open air. Need for additional experiments to establish the mechanism of this effect. Macrographs, tables, and graphs. (F22, K9, AY)

64-F. Sheet and Strip Rolling and the Possibility of Their Application in Spain. (In Spanish.) Isidro Sans Darnis. *Instituto del Hierro y del Acero,* v. 3, Oct.-Dec. 1950, p. 270-281.

Former and modern techniques, typical installations, advantages, and the Steckel mill. Diagrams show three kinds of sheet and strip rolling set-ups. (F23)

65-F. Forging Advances Point Way to Savings. *Aviation Week,* v. 56, Feb. 11, 1952, p. 22, 25-26.

Unit-cost comparison of four fabrication methods for aircraft parts (Al and Mg alloys) developed by Northrop. Waste through machining and improved techniques in forging. (F22, Al, Mg)

66-F. Heavy-Duty Mechanical Forging Presses. *Engineering,* v. 173, Jan. 25, 1952, p. 97-99.

Presses in use at Messrs. B. and S. Mossey, Ltd., Openshaw, Manchester, England. (F22)

67-F. Rare Metal Fabrication. *Metal Industry,* v. 80, Jan. 25, 1952, p. 66.

Methods used by Murex Ltd., of England, in the forging and rolling of Zr, W, Mo and Ta. (F22, F23, Zr, W, Mo, Ta)

68-F. Hot and Cold Forging Methods. (Concluded.) C. W. Hinman. *Modern Machine Shop,* v. 24, Feb. 1952, p. 112-114, 116, 118, 120.

Use of forging equipment in the manufacture of ordnance material from steel. (F22, ST)

69-F. An Examination of Modern Theories of Rolling in the Light of Rolling Mill Practice. (Continued). N. H. Polakowski. *Sheet Metal Industries,* v. 29, Jan. 1952, p. 11-16.

Various methods and apparatus for control of strip thickness. 16 ref. (To be continued.) (F23, S14)

70-F. Hot Forming Practice at Northrop Aircraft. Part I. Gilbert C. Close. *Steel Processing,* v. 38, Jan. 1952, p. 23-24.

Hot forming conditions and requirements, heating methods and mechanical properties of Mg alloy and Al alloy sheet and extrusions. (To be continued.)
(F21, F general, G general, Al, Mg)

71-F. (Book) **Teoriia Prokatki (Obshchie Osnovy Obrabotki Metallov Davleniem.)** (Theory of Rolling—General Basis of Forming Metals by Pressure.) S. I. Gubkin. 602 pages. 1950. State Scientific-Technical Publishing House for Ferrous and Nonferrous Metallurgy, Moscow, U.S.S.R.

Intended as a textbook for students in the metallurgical trades, but can be considered as a handbook of rolling and related processes. The question of plastic deformation is treated theoretically and is discussed in relation to many metallurgical factors. (F23)

72-F. New Forging Technique Utilizes Instrument Controlled Radiant Gas Heating Equipment. C. C. Roberts. *American Gas Journal,* v. 176, Feb. 1952, p. 16-17.

Equipment for heating steel rods to the correct temperature for forging. Advantageous forging qualities attained. An illustration of SAE 52100 steel shows the difference in grain structure produced by high-speed radiant gas heating and by conventional slower methods. (F22, ST)

73-F. Open Die Forges Titanium Cones. Harold Bernstein and Ernest T. Nicotera. *American Machinist,* v. 96, Feb. 1952, p. 136-137.

Results of tests which prove that carbon-bearing Ti can be worked, under proper conditions, into a hollow forging. (F22, Ti)

74-F. Die Forging of Steel. J. D. Latta. *British Steelmaker,* v. 18, Feb. 1952, p. 82-88.

The principles of die design and the manufacture of dies. Possibilities of this forging process both from the production and the cost point of view. The forging process and the plant used. (F22, ST)

75-F. A Way to Squeeze the Most Out of Strategic Materials. *Inco Magazine,* v. 25, Winter 1951-52, p. 22-23.

Saving of metal and machining costs through use of upset forgings. (F22)

76-F. A Theory of Tube Sinking. S. Y. Chung, and H. W. Swift. *Journal of the Iron and Steel Institute,* v. 170, Jan. 1952, p. 29-36.

Stresses and strains during tensile sinking of tubes. A theory is developed to calculate the sinking load, and to predict thickness and elongation strains that occur during tube sinking in dies of industrial profile. Friction, bending, thickness variation, and strain-hardening are considered. Effects of "thickness" stress distribution on strain development were investigated for steel, brass, and Cu. (F26, ST, Cu)

77-F. Abbey Works: A Description of the Rolling Mills and Accessory Plant. H. H. Ascough. *Sheet Metal Industries,* v. 29, Feb. 1952, p. 101-114.

Details of the 45-in. slabbing mill, slab shears, slab heating, 80-in. continuous mill, hot strip mill descaling, plate and sheet finishing, cut-up line, annealing, etc. (F23, ST)

78-F. The Working of Metals. W. C. F. Hessenberg. *Sheet Metal Industries,* v. 29, Feb. 1952, p. 144-146. (A condensation.)

Influence of internal and external strains on the properties of metals and alloys, with special reference to wiredrawing and rolling mill operations. (F23, F28, Q general)

79-F. Hadfields New Heavy Forge. *Machinery* (London), v. 80, Jan. 31, 1952, p. 195-200.

Two air-hydraulic forging presses of 2700- and 1500-ton capacity, together with the necessary reheating and heat treatment furnaces. (F22, J general)

80-F. Roll Size Effects in Rolling of Strip. N. H. Polakowski. *Metal Progress,* v. 62, Feb. 1952, p. 67-71.

Shows why roll diameter limits maximum draft and minimum thickness, but has no important effect on power required per ton of thin strip rolled. (F23)

81-F. Metallurgy of Drop Forging. E. Gregory. *Metal Treatment and Drop Forging,* Feb. 1952, p. 67-72; disc. 72-74.

Metallurgical aspects, including overheating and burning. (F22)

82-F. Tool and Die Materials for the Extrusion of Nonferrous Metals. *Metal Treatment and Drop Forging,* Feb. 1952, p. 86-88.

A discussion sponsored by the Institute of Metals at the University of Birmingham. (F24, G5, T5, TS, EG-a)

83-F. The Wire Capacitor and Other Composite Drawn Products. J. L. H. Jonker and P. W. Haaijman. *Philips Technical Review,* v. 13, Dec. 1951, p. 145-151.

By means of a special drawing process—the drawing of a tube containing a wire core, with the space in between filled with an insulating material—it was found possible to manufacture capacitors possessing very good properties. Details of manufacture utilizing Cu and Ni, and some applications. (F28, T1, Cu, Ni)

84-F. Correct Cutting Practices for Stainless Steel Sheets. E. M. Rains. *Sheet Metal Worker,* v. 43, Feb. 1952, p. 42-43.

(F29, SS)

85-F. Manufacture of Large-Diameter Pipe. *Welding and Metal Fabrication,* v. 20, Feb. 1952, p. 49-53.

Forming, welding, and testing the transcontinental gas pipe line of special Mn steel. (F26, AY)

86-F. Control of Die Profiles by Measurement of Die Load and of Partly Drawn Wire. J. G. Wistreich. *Wire Industry,* v. 19, Feb. 1952, p. 131.

Includes tabular data comparing methods of measuring profiles and sizes of wire-drawing dies (F28)

87-F. Electrical Equipment in Steel Mills. W. B. Ferguson, *Midwest Engineer,* v. 4, pt. 1, Jan. 1952, p. 3-4, 20-23, 25.

Bessemer requirements, rolling mills, cold strip mills and motor problems. (F23, D3, ST)

88-F. Increasing Drop Forging Die Life. Part IX. Die Lubrication. John Mueller. *Steel Processing,* v. 38, Feb. 1952, p. 68-70, 101.

Graphitic materials as suitable lubricants. Other factors such as proper forging and finishing temperature. (F1, F22)

89-F. Greater Flexibility in Aluminum Extrusion Cuts Cost of Short Runs. Herbert Friedman. *Western Metals,* v. 10, Feb. 1952, p. 47-48.

Techniques of billet heating and extrusion which permit greater flexibility and consequently lower cost per unit for short production runs. (F24, Al)

90-F. Magamp Regulation of a Tandem Cold-Reduction Mill. W. R. Aul. *Westinghouse Engineer,* v. 12, Mar. 1952, p. 64-66.

Application of magnetic amplifiers in the control of drive equipment on tandem cold reduction steel mills. (F23, S18, ST)

91-F. Beryllium Copper Wire: Its Processing and Uses. John T. Richards. *Wire and Wire Products,* v. 27, Feb. 1952, p. 149-154, 192-193, 195.

Drawing, heat treating, plating, joining, and applications. Table, graphs, and illustrations. (To be continued.) (F28, Cu)

92-F. Influence of the Distribution of C, P, and S on the Use of Ingots of Rimmed Openhearth Steel for the Production of Tubes. (In Czech.) Vaclav Rauner. *Hutnické Listy,* v. 6, Dec. 1951, p. 582-586.

A study was made of the effect of segregation on the use of rimmed openhearth ingots for the production of seamless tubing. The steels used contained up to 0.15% C. 117 macrographs of ingot structures. (F26, N12, M28, CN)

93-F. Commission of Engineers of Large and Small Rolling Mills. (In French.) *Circulaire d'Informations Techniques,* v. 9, Jan. 1952, p. 91-112.

Summaries of a series of reports by various authors on rolling mills with respect to means of protecting steel, rolling of incompletely solidified rail ingots, deformation of the segregated zone of rimmed soft steel during rolling, etc. Tables, diagrams, and photographs. (F23, ST)

94-F. Extrusion of Steel. (In French.) J. Sejournet. *Métallurgie et la Construction Mécanique,* v. 83, Nov. 1951, p. 889-891.

The working of nonferrous metals, economic aspects, and future possibilities. Drawing and photographs. (F24, ST)

95-F. Modern Controls and Drives for Rolling Mills. (In German.) Conrad von Kissling. *Stahl und Eisen,* v. 72, Feb. 14, 1952, p. 165-173; disc., p. 173-174.

Includes limitations of each type. (F23)

96-F. Heavy Crankshafts. Production of Integral Fibrous Structure. (In French.) J. M. Vialle and J. Lafont. *Métallurgie et la Construction Mécanique,* v. 83, Nov. 1951, p. 929-931, 933.

The structure of a steel ingot, and changes which it undergoes upon hot transverse deformation. How hot forging can be used to produce crankshafts having desired structure. Advantages over former methods. Micrographs, sketches, photographs, and tables. (F22, CN)

97-F. Equipment for Hot Rolling of Sharp-Angled Steel T-Bars. (In French.) Louis Gascuel. *Métallurgie et la Construction Mécanique,* v. 83, Dec. 1951, p. 991, 993, 995.

Includes diagrams. (F23, ST)

98-F. Heat Transfer and Furnace Efficiency in the Rapid Heating of Steel. (In German.) C. A. Landfermann. *Bau und Betrieb,* v. 4, Jan. 1952 (supplement to *Gas- und Wasserfach,* v. 93, Jan. 1, 1952), p. 1-3.

Includes tabulated and graphed data, showing a linear relationship between rate of charge per unit hearth area and attainable thermal efficiency. Applicable both to heat treating and hot working operations. (F1, J general, ST)

99-F. Gaging and Preparation Process for Drawing-Die Holes With Predetermined Rounding-Off Radii and Bearing Lengths. (In German.) Siegfried Werth. *Stahl und Eisen,* v. 72, Jan. 17, 1952, p. 66-69.

Accuracy of measuring the bearing length of finished drawing dies by the two-needle method; calculation of the initial bearing length of a sharp-edged die contour; and determination of the rounding-off radius by intermediate measurements

during manufacture. Schematic diagrams and tables. (F28, T5)

100-F. Effect of Coil Weight and Rolling Speed on the Hourly Output of Cold Rolling Mills. (In German.) Hans Pannek. *Stahl und Eisen,* v. 72, Jan. 17, 1952, p. 70-75.

Development of output diagrams for rolling heavy sections, for rolling thin sections, for reversing mills, for a tandem mill. Graphs. (F23, ST)

101-F. Output and Efficiency of Cold Rolling Mills Shown by a Graphical Method of Universal Validity. (In German.) Werner Lueg. *Stahl und Eisen,* v. 72, Jan. 17, 1952, p. 75-79.

Derivation of the efficiency of cold rolling mills and of their output from the rolling-time formula of A. Pomp. Two nomographs for application. (F23)

102-F. Trostre Works; a Description of the Rolling Mills and Accessory Plant. J. S. Gazard and Garnet E. Jones. *Sheet Metal Industries,* v. 29, Mar. 1952, p. 198-210.

Layout, continuous pickler, 5-stand tandem cold mill, electrolytic cleaning, annealing, gas plant, temper mills, electrolytic tinning, etc., at above plant of Steel Co. of Wales. (F23, L13, L17, J23, ST)

103-F. Steel Extruding Puts the Squeeze on Conventional Forming. H. J. Altwicker and K. F. Braeuninger. *Steel,* v. 130, Mar. 17, 1952, p. 88-90.

A versatile extrusion process which produces a variety of shapes with no more than a change of dies. A comparison of mechanical properties of some extruded and rolled materials. (F24, Q general, ST)

104-F. Fundamentals of Building; How Plates and Steel Shapes Are Rolled. *Steelways,* v. 8, Mar. 1952, p. 16-17.

Illustrations and brief descriptions. (F23)

105-F. Surface Conditioning of Structural Steel. R. E. Somers and H. C. von Blohn. *Welding Journal,* v. 31, Mar. 1952, p. 193-198.

Conditioning methods applied by Bethlehem to structural shapes after rolling, such as grinding, chipping, and welding. Relative applications of each. Stresses conditioning by welding. (F29, G18, K general, CN)

106-F. Calculation of Intermediate Measurements When Drawing on Multiple Drawing Machines. (In German.) Karl Schemmer. *Archiv für das Eisenhüttenwesen,* v. 22, Nov.-Dec. 1951, p. 367-370.

Three main types of above equipment, and how to make the necessary calculations. Includes graphical interpretation. (F28)

107-F. Does New Process Challenge Foundries? Lorne Frame. *Canadian Metals,* v. 15, Mar. 1952, p. 28-29.

Cored forging and pressing, described as bridging the gap between sand and die casting. The process is of potential importance to manufacturers of aircraft parts, valve and plumbing fixtures, automobiles, gears, fire-fighting equipment, fuse components, lock hardware, electrical fittings, and many others. (F22)

108-F. Model Mill Rolls Model Rail. Dillon Cox and W. P. Wallace. *Iron Age,* v. 169, Apr. 3, 1952, p. 140-141.

Rolling mill which cold rolls model railroad rail in four passes. Mechanical properties of SAE 1020 wire and rail. (F23, Q general, CN)

109-F. High Temperature — High Speed Heating for Steel Rounds. A. F. Kritscher. *Iron and Steel Engineer,* v. 29, Mar. 1952, p. 55-60; disc., p. 60-62.

Application of principles of high-speed heating to new types of heating units, used prior to the seamless tubemaking process, for economy in heating and better quality of product. A number of new heating principles have been developed. New barrel-type furnace of National Tube Div., U. S. Steel Co. Heating-rate graphs for stainless and carbon steel rounds. (F21, CN, SS)

110-F. Operating and Economic Aspects of High Speed Tandem Cold Reduction Mills. F. K. Schefe. *Iron and Steel Engineer,* v. 29, Mar. 1952, p. 103-107; disc., p. 107-108.

A general discussion as applied to sheet steel production. (F23, CN)

111-F. The Hot-Forging of Metals. H. K. Breton. *Machinery* (London), v. 80, Mar. 6, 1952, p. 410-414.

General discussion includes the difference between impact extrusion and hot forging. Clarified by diagrams. (F22, G5)

112-F. Defects in Rolled Products. *Metal Progress,* v. 61, Mar. 1952, p. 98, 100, 102, 104. (From Report No. 193, Subcommittee on Rolling, *Verein Deutscher Eisenhüttenleute,* by Paul Grüner and T. Bruggeman.)

Identifies and groups defects into: material defects which originate in the melting shop; defects which arise in the rolling mill; and defects which can be remedied through a definite heat treatment in the rolling mill. (F23, ST)

113-F. Plug-In Induction Heating. B. E. McArthur. *Steel,* v. 130, Apr. 7, 1952, p. 118-119.

60-cycle power provides compact induction-heating unit for extrusion

of nonferrous billets. Requires no motor-generator set. (F21, EG-a)

114-F. Modern Metallurgical Trends in the Production of Steel Plates. W. Barr. *West of Scotland Iron and Steel Institute Journal,* v. 58, 1950-51, p. 1-10.

Present status with respect to compositions, mechanical properties, and fabrication methods. Use of a low-alloy, high-tensile, weldable steel seems to be the trend, in order to obtain required properties plus a substantial reduction in plate thickness. (F23, CN, AY)

115-F. Production of Bolts and Nuts. A. P. Newall. *West of Scotland Iron and Steel Institute Journal,* v. 58, 1950-51, p. 49-62; disc., p. 62-64.

Development of mass-production methods of bolt-and-nut manufacture, especially by cold upsetting or hot forging. Physical and metallurgical characteristics required. Application of high-frequency heating in forging and heat treatment. (F22, J2, CN)

116-F. The Manufacture of Seamless Steel Tubing in Australia. J. Porteous. *Australasian Institute of Mining and Metallurgy, Proceedings,* new ser., Mar. 31-June 30, 1947, p. 181-203.

Important processes, and the essential differences between the various methods of rotary and nonrotary piercing, with their accompanying processes of elongation. Principles of the push-bench process are sketched. (F26, ST)

117-F. Steel Wire. F. Jenks. *Australasian Institute of Mining and Metallurgy, Proceedings,* new ser., Mar. 31-June 30, 1947, p. 337-358.

Manufacturing, properties, and uses. Graphed and tabulated data. (F28, CN)

118-F. H-P H-T Pipe Dreams Come True. Dawson Powell. *Power,* v. 96, Apr. 1952, p. 73-79.

Manufacture of main-steam piping for New England Power Co.'s Salem Harbor Station. Includes forging, heat treatment, boring, bending, ultrasonic inspection, and arc welding. Material is 2¼% Cr, 1% Mo steel. (F26, AY)

119-F. The Manufacture and Use of Fourdrinier Wire Cloth. A. G. Hose and J. P. Johnson. *Wire and Wire Products,* v. 27, Mar. 1952, p. 249-254, 313.

The exacting requirements of this specialized type of wire and the product into which it is made. Wire production and weaving. Alloys used are phosphor bronzes with 7-8% Sn, 0.2-0.3% P, balance Cu. (F28, G6, T29, Cu, Sn)

120-F. (Book) Extrusion of Plastics, Rubber, and Metal. Herbert R. Simonds, Archie J. Weith, and William Schack. 454 pages. 1952. Reinhold Publishing Corp., 330 W. 42nd St., New York, N. Y. $10.00.

About two-thirds of the material is devoted to extrusion of plastics. One chapter (45 pages) on metal extrusion, direct, indirect, and impact. Procedures for various metals. (F24, G5)

121-F. More Forging With Radiant Furnaces at Oldsmobile Plant. *Automotive Industries,* v. 106, Apr. 15, 1952, p. 54-56, 82.

Barrel-type furnace for handling carbon steel billets. (F21, CN)

122-F. Turbine Blades in Half the Time. Richard E. Stockwell. *Aviation Age,* v. 17, Apr. 1952, p. 40-41.

The Omes upsetting machine pushes a bar stock back onto itself by 30-50 diameters and cuts turbine blade production in half. (F22, ST)

123-F. Behind the Venetian Blind —Aluminum Strip Rolled From Continuously Cast Bar. J. L. Hunter and R. A. Quadt. *Iron Age,* v. 169, Apr. 10, 1952, p. 118-120.

Hunter Douglas machine for continuously casting Al and its alloys into horizontal bars 55 ft. or longer produces cast bars that are subsequently hot rolled to strip without scalping or edge trimming. Surface and edge quality is of such order that scarfing operations considered normal in the Al wrought industry are not necessary. Metallurgical soundness and uniformity are at least equivalent to commercial material. (F23, C5, Al)

124-F. Wax Filamented Model Billets Aid Study of Material Flow. J. L. Holmquist. *Product Engineering,* v. 23, Apr. 1952, p. 158-163.

Displacement and change of shape of colored wax filaments in a wax billet show how material flows in various stages of the Mannesmann process. Analysis of observations is presented in terms of the type and amount of deformation the material is subjected to in the rolling and piercing operation. Diagrams and illustrations. (F23, Q24)

125-F. Experts Outline Factors in Forging. Thomas Gialdini. *SAE Journal,* v. 60, Apr. 1952, p. 69-70.

Questions and answers in panel discussion on forging held at SAE National Tractor Meeting, Milwaukee, Sept. 10, 1951. (F22)

126-F. The Art of Anchor Forging. C. D. Linnenbank. *Steel Processing,* v. 38, Apr. 1952, p. 167-171, 205.

The function of an anchor and describes the three major types in use today. (F22, ST)

127-F. What's New in Forging Equipment. Part I. Hammer Designs Show Trend. Part II. John C. McComb. *Steel Processing,* v. 38, Mar. 1952, p. 128-130; Apr. 1952, p. 175-179. (F22)

128-F. The New Blooming Mill at Donawitz, Its Equipment and Operation. (In German.) Alois Vacek. *Stahl und Eisen,* v. 72, Mar. 13, 1952, p. 291-296.

Diagrams and illustrations. (F23, ST)

129-F. Automatic Extrusion Plant for the Aston Chain and Hook Company. *Engineering,* v. 173, Mar. 21, 1952, p. 374-376; Mar. 28, 1952, p. 392-394. **An Extrusion Plant.** *Engineer,* v. 193, Mar. 28, 1952, p. 444-447.

A 2000-ton horizontal extrusion press used by above British firm for production of brass and Cu sections, particularly commutator sections, for the electrical industry. They also produce a number of brass and Cu tubes and special hollow sections. (F24, Cu)

130-F. Latest Developments in Extrusion of Metals. Erwin Loewy. *Iron and Steel Engineer,* v. 29, Apr. 1952, p. 65-69; disc., p. 69-70.

Many of the problems faced in this field. Confined to hot extrusion. Chiefly considers high-temperature alloys. (F24, SG-h)

131-F. Pressure Distribution Between Stock and Rolls in Hot and Cold Flat Rolling. C. L. Smith, F. H. Scott, and W. Sylwestrowicz. *Journal of the Iron and Steel Institute,* v. 170, Apr. 1952, p. 347-359.

Method using a photo-elastic dynamometer; also, devices for measuring back tension and total force separating the rolls. Results given for cold rolling of annealed Cu strip, 2 mm. thick by 40 mm. wide, for reductions from 5-50%, and for similar hot rolled Cu strips with reductions of 18, 26, and 36%. Comparisons made with results calculated by Orowan's method. Apparatus diagrams and graphs. 13 ref. (F23, Cu)

132-F. The Hot Forging of Metals. H. K. Barton. *Machinery* (London), v. 80, Apr. 17, 1952, p. 679-683.

Methods and processes. Numerous diagrams. (F22)

133-F. New Forge and Heat-Treatment Plant for Die-Block Manufacture. L. H. Williams. *Metal Treatment and Drop Forging,* v. 19, Apr. 1952, p. 155-165.

Plant of Walter Somers Ltd., Halesowen, North Birmingham, England. Generally uses Ni-Cr-Mo and high-tensile plain carbon steel. (F22, J general, TS, CN)

134-F. Rotary Furnaces Feed Automatic Steel Treating Line. A. Q. Smith. *Iron Age,* v. 169, May 8, 1952, p. 122-124.

Two jet combustion, gas-fired forging furnaces and a modern conveyer system installed in the East Chicago plant of General American Transportation Corp., and used for heating and handling billets for 90, 105 and 120-mm projectiles. These billets are hot-extruded and drawformed. (F21, F24, G4)

135-F. Sheath Working of Zirconium Ingots. E. T. Hayes, G. L. Frederic, and E. D. Dilling. *Metal Progress,* v. 61, May 1952, p. 83-86.

Procedure consists of sheathing the Zr ingots in heavy-wall seamless mechanical tubing, and welding end plugs to the sheath to form a complete seal. After forging and rolling, the Fe sheath is stripped and the Zr metal worked to finished size. (F22, F23, Zr)

136-F. An Examination of Modern Theories of Rolling in the Light of Rolling Mill Practice. N. H. Polakowski. *Sheet Metal Industries,* v. 29, Apr. 1952, p. 315-324.

(To be continued.) (F23, ST)

137-F. Modern Extrusion Plant. *Metallurgia,* v. 45, Apr. 1952, p. 173-177. Mechanized Extrusion Press. **Welding and Metal Fabrication,** v. 20, May 1952, p. 174, 188.

New plant of the Aston Chain and Hook Co., Ltd., Erdington, Birmingham, England. This installation includes a 2000/200-ton Fielding horizontal extrusion press together with the necessary billet handling and heating equipment. (F24)

138-F. Rolling of Angles. (In French.) M. J. Courtheoux. *Circulaire d'Informations Techniques,* v. 9, Apr. 1952, p. 534-542.

Compares American and British rolling methods with European methods. Diagrams and tables. (F23)

139-F. Friction, Wear, and Lubrication in Wiredrawing. (In German.) Werner Papsdorf. *Stahl und Eisen,* v. 72, Apr. 10, 1952, p. 393-399.

Short historical survey of the application of lubricants. The latest theories and experiments on friction and wear. Graphs, tables, and diagrams. 17 ref. (F28, Q9)

140-F. Lubricants and Coatings for Drawing of Steel Wire. Part I. (In German.) Werner Lueg and Karl-Heinz Treptow. *Stahl und Eisen,* v. 72, Apr. 10, 1952, p. 399-412; disc., p. 412-416.

Reviews theory of wiredrawing lubrication. Materials tested, test

procedures, and their interpretation, influence of different coatings and lubricants on coefficient of friction and mean pressure in drawing of steel wire. Graphs, tables, and micrographs. 26 ref. (F28, ST)

141-F. Design and Mode of Operation of a Cluster-Type Reversing Cold-Rolling Mill With a Fluid Drive. (In German.) Martin Reimann. *Stahl und Eisen,* v. 72, Apr. 10, 1952, p. 416-421; disc., p. 421-423.

High-speed reversing cold rolling mills having very thin working rolls for production of cold-rolled steel strip of very small gage. Continuously variable mill drive by means of fluid-drive gears with 120 atm. of working pressure. Design and operation of the fluid-drive gear. Oil-hydraulic regulators for controlling the roll drive, reels, and tension strip. Operational results. Schematic diagrams. (F23).

142-F. (Book) **Forging and Forming Metals.** S. E. Rusinoff. 279 pages. American Technical Society, Drexel Ave. at 58th St., Chicago 37, Ill. $3.95.

Impact forging, press forging, upset forging, extrusion, heat treatment of forgings, cleaning and finishing of forgings, inspection, safety, metal quality, and design of forged parts, as well as tools and dies. Entire sequence of some forging operations is illustrated — from the first operation on metal stock to the finished forgings. Standard practices and tolerances for impression die forgings; a glossary of forging terms, and an appendix of tables. (F22)

143-F. Tubes From Slugs. 125 Extrusions per Minute. Frank Charity. *American Machinist,* v. 96, May 26, 1952, p. 100-101.

Downward extrusion, or "squirting," is employed in a 75-ton press to produce aluminum tubes to close specifications at AiResearch. Impact, heat (900° F.), and pressure cause the metal to squirt through a space between the mandrel and the die walls, thus creating a continuous Al tube. (F26, Al)

144-F. Operations in Extruding Hollow Steel Propeller Blades. *Automotive Industries,* v. 106, May 15, 1952, p. 38-39.

Each of 13 steps is illustrated schematically. Cr-Ni-Mo steel is used. (F24, SS)

145-F. Forging and Heat Treating of Shells Is Speeded by Newest Equipment. Arthur Q. Smith. *Industrial Gas,* v. 30, May 1952, p. 5-7, 23-24.

Two new jet-combustion, gas-fired forging furnaces and a modern conveyor system for heating and handling of billets for hot extrusion and draw forming of 90, 105, and 120-mm. projectiles. Also two new jet-combustion, gas-fired rotary furnaces, one for heat treating and the other for drawing. Equipment is located in the East Chicago, Ind., plant of General American Transportation Corp. (F21, J general, ST)

146-F. Automatic Forging Presses Feature New Shell Line. John A. Verson and Henry Irwin. *Iron Age,* v. 169, May 22, 1952, p. 117-125.

Full automaticity and fast production of closed-die forgings on large mechanical presses are features of press line engineered and built by Verson Allsteel Press Co. No manual labor is needed from the time the billet leaves the furnace until the finished shell drops onto the conveyor belt. Water-cooled die pots and punches are used. Transfer equipment is air-driven and electrically controlled. Diagrams and illustrations. (F22, ST)

147-F. Tight Motor Design Powers Fastest Cold Mill. Bruce D. Mickey. *Iron Age,* v. 169, May 22, 1952, p. 126-129.

Five-stand cold mill being installed at the Fairless Works of U. S. Steel Co. will have a delivery speed of 7000 ft. per min. Successful commutation at high overloads has necessitated use of a 6-unit motor on the 5th stand of this mill. Diagrams and illustrations. (F23, ST)

148-F. Strip Rolling Adds to Warehouse Service. *Steel,* v. 130, May 19, 1952, p. 100.

Single-stand reversing mills, 4-high, are used to roll strip to customer specifications by Production Steel Coil, Inc., at Detroit, Buffalo, and Chicago. (F23, ST)

149-F. Applications of Electric Upset Forging. Paul Granby. *Steel Processing,* v. 38, May 1952, p. 228-231, 243.

An automatic electric upsetting machine is used to heat the initial round or flat stock and simultaneously upset it into a head which will contain the exact volume of metal required for forming the final shape. Typical applications are production of poppet valves for internal combustion engines and of jet-engine blades. All kinds of ferrous and nonferrous metals can be handled. (F22)

150-F. Straightening Structural Members in Place. Howard L. Harrison. *Welding Journal,* v. 31, May 1952, p. 257s-262s.

Results of research on underlying principles of methods used successfully in straightening damaged bridge members and effects on the metal of these methods. Present straightening techniques, experiments with members under load, and suggested straightening procedures. Results of tension, hardness, and impact tests, and of microstructural examination of straightened mild-steel flat bars. (F29, Q general, CN)

151-F. Application of the Theory of Plasticity to the Shaping of Metals. Rolling of Thin Strips. (In French.) J. Lerebours-Pigeonniere. *Metaux: Corrosion—Industries,* v. 27, Mar. 1952, p. 119-134.

Properties of hot and cold metals, problems caused by contact of machine parts with the metal, and application of theory of plasticity to rolling of thin strips. Diagrams and graphs. 19 ref. (F23, Q23)

152-F. Study of the Surface Defects of Rolled Aluminum Semifinished Products: "Netting". (In French.) J. Hérenguel, M. Scheidecker, and F. Santini. *Revue de Métallurgie,* Apr. 1952, p. 283-292.

"Netting" is a surface defect characterized by a network of grooves (or fine cracks) visible on the surface of rolled Al products, the depth of which is limited to a few thousandths of a millimeter. Causes, means of elimination, and preventive measures. Micrographs and tables. (F23, Al)

153-F. Design and Operation of Modern Soaking Pits and Equipment. (In German.) Oskar J. Stebel. *Stahl und Eisen,* v. 72, Apr. 24, 1952, p. 466-474; disc., p. 474-475.

Describes, diagrams, and illustrates various types. Includes burners, rerfactory linings, recuperators, fuels used, preheating of air and gas, slagging practice, fuel consumption, etc. (F21)

154-F. Cold-Reduction Plant for Production of Tin-Plate at Trostre, Llanelly. H. Leighton Davies. *Engineering,* v. 173, May 16, 1952, p. 629-632.

See abstract under similar title from *Journal of the Iron and Steel Institute,* item 161-F below. (F23, L16, CN, Sn)

155-F. Temperature Measurements in Wire Drawing With a Wire-Die Thermocouple. W. Lueg. *Engineers' Digest,* v. 13, May 1952, p. 160.

Previously abstracted from original in *Stahl und Eisen.* See item 23-F, 1952. (F28, S16, ST)

156-F. Welded Tubing Produced on Fast, Automatic Lines. Frank Manor. *Iron Age,* v. 169, May 29, 1952, p. 96-97.

Two lines convert SAE 1010 and 1020 steel coil into finished welded tubing, cut to size and ready for forming, at Ford Motor Co.'s Mound Road Plant in Detroit. The tubing is used to make drive shafts and rear-axle tubes. Annealing is included for larger diameter tubing. (F26, CN)

157-F. Big Salt Bath Heats Steel Forging Billets. *Iron Age,* v. 169, June 5, 1952, p. 141.

Equipment at U. S. Air Force Experimental Plant, managed by Bohn Aluminum Corp., Adrian, Mich. (F21, ST)

158-F. Cold Rolling With Strip Tension. Part I. A New Approximate Method of Calculation. *Iron & Steel,* v. 25, May 17, 1952, p. 211-216; disc., p. 251-256.

Computational work. Presents the results graphically, in a form which allows roll force and torque to be calculated rapidly and simply. (F23)

159-F. Cold Strip Rolling; Effect of Tension on Torque and Roll Force. W. C. F. Hessenberg and R. B. Sims. *Iron & Steel,* v. 25, May 17, 1952, p. 217-220; disc., p. 251-256.

The principal experimental results comprise measurements of roll force and torque at reductions of approximately 30 and 50%, on annealed material and on material which had previously been cold rolled to a reduction of about 40%. Results are also included for annealed strip during cold rolling. (F23)

160-F. Hot and Cold Flat Rolling; Pressure Distribution Between Stock and Rolls. C. L. Smith, F. H. Scott, and W. Sylwestrowicz. *Iron & Steel,* v. 25, May 17, 1952, p. 220-224, 233; disc., p. 251-256.

See abstract under similar title from *Journal of the Iron and Steel Institute,* item 131-F, 1952. (F23, Cu)

161-F. Presidential Address; Development of the Tinplate Trade. H. Leighton Davies. *Iron & Steel,* v. 25, May 17, 1952, p. 264-269. (A Condensation.)

See abstract from *Journal of the Iron and Steel Institute,* item 165-F, below. (F23, L16, CN, Sn)

162-F. Phosphate Coatings as Lubricants in the Severe Cold Forming of Metals. Part 1. General Description. S. Spring. **Part 2. Application.** Ludwig K. Schuster. *Iron and Steel Engineer,* v. 29, May 1952, p. 64-71; disc., p. 71.

General description, formation and mechanism of action. Application of these coatings to stamping;

wire, tube, and deep drawing; and cold-extrusion operations in the steel industry. Tables. (F1, G21, ST)

163-F. Design and Operation of Electric Weld Pipe Mill at National Tube's National Works. G. C. Anderson. *Iron and Steel Engineer,* v. 29, May 1952, p. 96-101; disc., p. 101.

Mill located at McKeesport, Pa., was built to make large-diameter high-strength pipe for transmission of natural gas under high pressures. Photographs and layout diagram. (F26, CN)

164-F. Measurement of Die Pressures in Wire Drawing By Photo-Elastic Methods. P. M. Cook and J. G. Wistreich. *Journal of Applied Physics,* v. 3, May 1952, p. 159-165.

Pb-Sn alloy strips are drawn through a wedge-shaped die made of stress-optically sensitive plastic. Filon's method of stress analysis was used. The pattern of isoclinics was found to have new features. Photographs, diagrams, and graphs. 10 ref. (F28, Q25)

165-F. The Development of the Tinplate Trade With Particular Reference to the Installation of the Cold-Reduction Plant at Trostre, Llanelly. H. Leighton Davies. *Journal of the Iron and Steel Institute,* v. 171, May 1952, p. 15-37.

History of development of present-day equipment and procedures. Steel sheet rolling, pickling, cleaning, annealing, shearing, and electrolytic and hot-dip tinning. Numerous diagrams and illustrations. (F23, L16, CN, Sn)

166-F. Comparisons Between British and American Rolling-Mill Practices. G. Foster. *Journal of the Iron and Steel Institute,* v. 171, May 1952, p. 87-91; disc., p. 91-96.

From report of British Iron and Steel Productivity Team (F23)

167-F. Developments in Cold-Flow Pressing and Extrusion of Steel. Karl Sieber. *Machinery* (London), v. 80, May 22, 1952, p. 891-897; May 29, 1952, p. 937-941. (Translated from *Draht.*)

Developments in cold forging techniques. Fundamental factors governing the plastic behavior of metal during cold forming. Diagrams and graphs. (F22, F24, ST)

168-F. Wheel Production at Steel, Peech and Tozer. *Metallurgia,* v. 45, May 1952, p. 247-249. **Steel, Peech & Tozer Railway Wheel Mill.** *Machinery* (London), v. 80, May 15, 1952, p. 857-860.

Processes include forging, rolling, and heat treating. (F22, F23, J general, CN)

169-F. Utilising the Hammer: Productivity in the British Drop-Forging Industry. *Metal Treatment and Drop Forging,* v. 19, May 1952, p. 233-236.

A brief survey of developments in the British drop forging industry subsequent to the visit to America in 1949 of the Productivity Team. (F22)

170-F. Extruding Precision Aluminum Tubing. Bartlett West. *Modern Machine Shop,* v. 25, June 1952, p. 122-124, 126, 128, 130, 132, 134-135.

Method of manufacturing tubing used in nearly 75 types of aircraft heat exchangers at AiResearch Mfg. Co., Los Angeles. (F26, Al)

171-F. Fiberglass Sheath the Secret: New Method Makes Stainless Extrusion Practical. *Steel,* v. 130, June 2, 1952, p. 92-96.

New equipment and procedure at Babcock & Wilcox provides the first American extrusion press having the speed and other design features necessary to take full advantage of the French Ugine-Sejournet hot extrusion process. The plant has successfully extruded stainless Types 304, 321, 310, 316, and 446; pure Mo; and pure Ti. Extrusion of a tube from a round-cornered, square, continous-cast billet, wherein a finished tube was produced from molten steel in just three operations. A Fiberglass sock melting on contact with the hot steels prevents seizing of the billet and tools, and insulates the tools from heat. Excellent lubricating properties of the glass reduce friction and make possible increased billet length. (F24, SS, Mo, Ti)

172-F. Hunter Douglas' Continuous Casting Method Converts Molten Aluminum to Strip in a Matter of Minutes. J. L. Hunter and R. A. Quadt. *Western Metals,* v. 10, May 1952, p. 33-35.

See abstract under similar title, *Iron Age;* item 123-F, 1952. (F23, C5, Al)

173-F. Aluminium Cable Making in India. *Wire Industry,* v. 19, May 1952, p. 454-455.

Operations at a specific plant. Al rod and galvanized-steel wire are the raw materials. (F28, Al, ST)

174-F. The Forces and Tensions of the Wire Drawing Process. E. Siebel. *Draht* (Wire) (English Ed.), Dec. 1951, p. 11-15.

Theoretical aspects and practical implications of this knowledge. Graphs. (F28)

175-F. Area Reduction and Distribution of Draws for the Drawing of Iron and Steel Wire. Friedrich Kohlhase. *Draht* (Wire) (English Ed.), Dec. 1951, p. 15-17.

Method of calculations, table of values for use in connection with them, and numerical examples. (F28, Fe, ST)

176-F. Some Well-Known Methods for Checking the Profile of Drawing Die Bores. Gerhard Reitzig. *Draht* (Wire) (English Ed.), Dec. 1951, p. 25-27.

Diagrams and illustrations. (F28, S14)

177-F. Modern Measuring and Inspecting of Carbide Drawing Dies. Günther Jackwirth. *Draht* (Wire) (English Ed.), Dec. 1951, p. 33-34.

Instrument called the "Alfa Meter". Diagram and illustrations. (F28, S14)

178-F. How to Determine the Bore Profile of Carbide Drawing Dies. Karl Schimz. *Draht* (Wire) (English Ed.), Dec. 1951, p. 34-36.

Construction of various apparatus. (F28, S14)

179-F. The Heating of Dies in Metal Tube-Drawing and Extrusion Presses. (In German.) K. Laue and M. Arenz. *Metall,* v. 6, Apr. 1952, p. 188-190.

Reviews older and modern die heating installations on the basis of the literature. Photographs and diagrams. (F26, F24)

180-F. Practical Exploitation of Recuperative Rolling-Mill Furnaces. (In Russian.) P. V. Kobiakov and M. M. Kotrovskii. *Za Ekonomiiu Topliva,* v. 9, Mar. 1952, p. 8-12.

Construction and fuel economy of this type of furnace. Charts and diagrams. (F21)

181-F. Hollow Extruded Forgings Conserve Critical Materials. George W. Motherwell. *American Machinist,* v. 96, June 9, 1952, p. 119-121.

Method and tooling for making a part for an aircraft landing-gear cylinder using SAE 4340 alloy steel. (F24, AY)

182-F. Continuous Tube Forming and Welding. *Welding & Metal Fabrication,* v. 20, June 1952, p. 204-206.

Includes schematic diagram and illustration of equipment built by a British firm. Oxy-acetylene process. (F26, K2, ST)

183-F. (Book) **Der Kraftbedarf beim Fliesspressen Zylindrischer Hohlteile.** (Load Demands in the Extrusion of Cylindrical Hollow Tubes.) Hans-Joachim Kühne. 91 pages. 1951. Wilhelm Knapp, Halle, Germany. 7.20 DM.

In thesis form. Investigates factors influencing load demands on a crank press during the extrusion of a hollow tube from a cylindrical pellet. Experimental research was carried out on a 250-ton Schuler crank press with standard pellet diameter of 35 mm. and press speeds within the range 30-170 mm. per sec. Autographic recordings of punch load during an extrusion and stripping operation were photographed. Effect on the maximum extrusion load of several variables. Materials extruded included pure Al, Al-alloys Pb, Zn, Mg, and electrolytic Cu. A bibliography of German references and patents on cold extrusion up to 1943 is included. (F24, Al, Pb, Zn, Mg, Cu)

184-F. The Theory of Tube Producing Methods. E. J. Ripling. *American Institute of Mining and Metallurgical Engineers,* "Tube Producing Practice", 1951, p. 1-16; disc., p. 16.

Only the plastic forming operations are discussed; other forming processes such as casting shells are not considered. Graphs and illustrations. 15 ref. (F26)

185-F. The Production of Aluminum and Aluminum Alloy Tubing. T. F. McCormick. *American Institute of Mining and Metallurgical Engineers,* "Tube Producing Practice", 1951, p. 17-31; disc., p. 31.

Commercial equipment and procedures of Alcoa. Includes ingot casting, hydraulic extrusion, cold working, tube reduction, annealing operations, and mechanical properties of product. 11 ref. (F26, C5, J23, Q general, Al)

186-F. The Production of Copper and Copper Alloy Tubes. H. Y. Bassett. *American Institute of Mining and Metallurgical Engineers,* "Tube Producing Practice", 1951, p. 32-55; disc., p. 55-56.

The various major operations used in nonferrous tube mills. Includes billet casting, extrusion, piercing, drawing, finishing, annealing, inspection, packing, and shipping. (F26, C5, J23, S13, Cu)

187-F. The Metallurgical Factors Affecting the Production of Seamless Pipe. J. W. Schroeder. *American Institute of Mining and Metallurgical Engineers,* "Tube Producing Practice", 1951, p. 57-66; disc., p. 66-68.

Effects of variation in steelmaking practice. 12 ref. (F26, D general, ST)

188-F. The Production of Lead Tubes. G. O. Hiers. *American Institute of Mining and Metallurgical Engineers, "Tube Producing* Practice", 1951, p. 69-82.

Procedures and equipment for production of lead pipe and also lead cable sheath. 44 ref. (F26, Pb)

189-F. The Production of Nickel and High Nickel Alloy Seamless Tubing. W. A. Dickinson and H. F. Hendershot. *American Institute of Mining*

and Metallurgical Engineers, "Tube Producing Practice", 1951, p. 83-100; disc., p. 100-101.

Past and present methods employed by the Huntington Works of International Nickel Co. The various operations for both hot and cold processing are considered in their natural sequence, together with processing characteristics of the high-Ni alloys and the equipment used. (F26, Ni)

190-F. The Production and Properties of Magnesium Alloy Tubing. C. J. Huffman and G. Ansel. *American Institute of Mining and Metallurgical Engineers,* "Tube Producing Practice", 1951, p. 102-107.

Compositions, typical mechanical properties, and extrusion methods and equipment. (F26, Q general, Mg)

191-F. Heavy Forging Practice. G. A. Burrell. *Australasian Engineer,* Apr. 7, 1952, p. 46-56.

Comprehensive review. Includes tabulation of heavy-duty forging presses in various parts of the world, and description of heat-treatment methods, properties, and testing. 10 ref. (F22, ST)

192-F. Crankshaft Forging; Details of the New R. R. Continuous Grain-Flow Process. *Australasian Engineer,* Apr. 7, 1952, p. 109, 111-113, 115, 117. (Based on article by J. M. Vialle and J. Lafont.)

Previously abstracted from *Métallurgie et la Construction Mécanique.* See item 96-F, 1952. (F22, CN)

193-F. Precision Forging of Turbine Vanes, Blades and Buckets. *Automotive Industries,* v. 106, June 15, 1952, p. 34-35, 87-88.

Procedures at the Mt. Elliott Plant, Packard Motor Car Co., said to be first mass-production setup by an automobile manufacturer. Parts are made of stainless steel or high-temperature alloy. A new horizontal impact forging machine developed by Chambersburg Engineering Co. (F22, SS, SG-h)

194-F. Universal Tube and Section Mill. *Engineering,* v. 173, May 30, 1952, p. 669-672.

Equipment made by a British firm to produce not only welded tube in a variety of materials and cross-sections, but also a similarly wide range of cold rolled sections, all at one pass through the machine. Certain other operations, such as piercing, embossing, or indenting, can also be carried out, if required, by the use of auxiliary equipment. (F26)

195-F. Wheels and Discs: New Mill at Steel, Peech and Tozer's Ickles Works. *Iron & Steel,* v. 25, June 1952, p. 279-281.

Production of above items in the given British plant. Major aspects include operation of a 6000-ton wheel forging press and a vertical rolling mill, and heat treatment details. (F22, F23, J general, ST)

196-F. Temper Mill Symposium. Temper Rolling. J. F. Sellers, R. M. Peeples, and A. C. Halter. **Power Requirements.** Wm. P. Smith and J. E. Butler. *Iron and Steel Engineer,* v. 29, June 1952, p. 76-94; disc. 95-97.

Temper rolling and its power requirements. Numerous graphs and tables. (F23)

197-F. Symposium on Soaking Pits, at South Works. G. Primm. **At Indiana Harbor Works, Youngstown Sheet & Tube Co.** H. B. Helm. **At Wisconsin Steel Works.** R. N. Powel. **At Inland Steel Co., East Chicago, Ind.** P. C. Singleton. *Iron and Steel Engineer,* v. 29, June 1952, p. 98-102; disc., p. 102-105.

Soaking-pit operations at above plants. (F21)

198-F. New Tube Extrusion Process at Babcock & Wilcox Co. *Iron and Steel Engineer,* v. 29, June 1952, p. 106-110.

See abstract of "Fiberglass Sheath the Secret: New Method Makes Extrusion Practical." *Steel,* item 171-F, 1952. (F24, SS, Mo, Ti)

199-F. Powder Metallurgy vs. Drawn Wire Method of Producing Gears. John Rigby. *Metal Powder Association,* "Proceedings, Seventh Annual Meeting", 1951, p. 59-66; disc., p. 66-67.

Points out that "all wire is not necessarily cylindrical". Irregular shapes may be extruded, then sliced off to produce gears, etc. Procedures and equipment. Relative merits as compared with powder metallurgy. (F24, H general)

200-F. High Speed on the Prop Line. Laurence Critchell. *Steelways,* v. 8, May 1952, p. 11.

Extrusion in the manufacture of propeller blades made of Ni-Cr-Mo steel. (F24, SS)

201-F. Through the Billet Mill. *Steelways,* v. 8, May 1952, p. 16-17.

Colored diagrams describe billet rolling—the intermediate steelmaking stage between the ingot and finishing mill. (F23, ST)

202-F. (Czech.) Modern Research Practices in Rolling Mills. Eduard Krasmar. *Hutnické Listy,* v. 7, Apr. 1952, p. 182-186.

Discusses the above from the point

of view of increasing production of rolled shapes. Extensive tabular data. (F23)

203-F. (German.) **Foreign, in Particular Swedish, Steel-Bar and Wire-Rod Rolling Mills.** Theodor Dahl. *Stahl und Eisen,* v. 72, May 22, 1952, p. 605-611.

Swedish steel-bar rolling mills. Mill stands of special design. Roller guides. Mechanization of American steel-bar rolling mills. Morgoil bearings. Single drives in open finishing trains. American and Swedish wire-rod rolling mills. Prospects. Diagrams and illustrations. (F27, ST)

204-F. (German.) **Deformation Conditions in Rail Rolling Using the Thyssen-Type Roll-Pass Design.** Hellmuth Vollmacher. *Stahl und Eisen,* v. 72, May 22, 1952, p. 611-616.

How to avoid cracks by a more thorough working of the material to be rolled in the axial direction of pressure by means of special processes and roll-pass designs. Comparison of the flow of material with the Thyssen-type roll-pass design and rolling processes used formerly. Influence of this design on strength properties of the rail foot. (F23, CN)

205-F. New Tube Extrusion Process at Babcock and Wilcox Co. *Industrial Heating,* v. 19, June 1952, p. 998-1000, 1002, 1004, 1006, 1008, 1010, 1012, 1014, 1016.

See abstract of "Fiberglass Sheath the Secret: New Method Makes Stainless Extrusion Practical". *Steel,* item 171-F, 1952. (F24, SS, Mo. Ti)

206-F. Furnaces and Mechanical Equipment for Forging and Forming of Metals and Alloys. Hale A. Clark. *Industrial Heating,* v. 19, June 1952, p. 1026, 1028, 1030, 1032, 1034, 1036, 1038.

The art of forging and three methods of heating. (F22, F21)

207-F. Principles of Continuous Gauge Control in Sheet and Strip Rolling. W. C. F. Hessenberg and R. B. Sims. *Institution of Mechanical Engineers, Proceedings,* sec. A, v. 166, No. 1, 1952, p. 75-81; disc., p. 81-90.

Previously abstracted from *Sheet Metal Industries.* See item 33-F, 1952. (F23, S14)

208-F. Tough Alloy Steels Successfully Hot Extruded. *Iron Age,* v. 170, July 3, 1952, p. 120-121.

See abstract of "Fiberglass Sheath the Secret: New Method Makes Stainless Extrusion Practical." *Steel,* item 171-F, 1952. (F24, SS, Mo, Ti)

209-F. Stretch-Flattening Machine Rolls Internally Stiffened Aluminum Skin Sections. *Light Metal Age,* June 1952, p. 21. (F29, Al)

210-F. Design of Forging Machine Tools. E. W. Mace. *Metal Treatment and Drop Forging,* v. 19, June 1952, p. 263-264, 274.

The design of tools and calculations involved in upset forging a simple axle shaft. Tables and diagrams. (F22, ST)

211-F. Lubrication in Steel Wire Drawing; Modern German Ideas. J. G. Wistreich. *Metal Treatment and Drop Forging,* v. 19, June 1952, p. 273-274.

Recent German trends of thinking. Includes brief treatment of good and bad lubricants and practical aids. (F28, ST)

212-F. Efficient Extrusion Set-Up Pays Off for Aluminum Product Manufacturer. D. O. Stiles and J. S. Gray. *Modern Metals,* v. 8, June 1952, p. 42-44.

Extrusion setup of Valley Metal Products Co., used in production of Al windows. The second and bigger extrusion press now being installed will greatly extend service to other extrusion customers. (F24, Al)

213-F. Warragamba Pipeline. W. I. Miskoe. *Welding Engineer,* v. 37, July 1952, p. 23-25, 64-65.

Construction of Australian water pipeline. Rolling, welding, cleaning, and coating procedures. Welding processes include automatic submerged-arc and manual-arc applied in butt, lap, tack, and fillet welds. Photographs. (F26, K1, L general, ST)

214-F. Bonderizing for Wiredrawing. *Wire Industry,* v. 19, June 1952, p. 537-545.

Development of Bonderizing process by a British firm. Includes introduction by Peter Smith and the following papers: "The Development and Control of the Bonderizing Process for Wiredrawing", W. A. Sandilands; and "The Application of Bonderizing for Wiredrawing", C. Coates. (F28, L14, CN, Zn)

215-F. (French.) **Drawing of Metallic Wires.** M. Bonzel. *Métaux: Corrosion—Industries,* v. 27, Apr. 1952, p.144-149.

Theory and practice. The shape and temperature of the wire; preparation of the surface of the wire, lubricants, and various wiredrawing machinery. (F28)

216-F. (German.) **Calculation of Drawing-Die Diameters for Multiple Drawing Machines.** Werner Lueg. *Archiv für das Eisenhuttenwesen,* v. 23, Mar./Apr. 1952, p. 95-101.

Proposes a graphical method for determining the mean diameter of wiredrawing dies, based upon the method of E. L. Baay. Method for

development of a generally valid diagram for this purpose. Use of a slide rule for rapid determination of drawing-die diameter and related factors. Diagrams and graphs. (F28)

217-F. (German.) **Steels for Large Forgings.** Sepp Ammareller and Paul Grün. *Stahl und Eisen,* v. 72, June 5, 1952, p. 653-662; disc., p. 662.

Production, forging, and testing of large ingots. Inspection for surface-finish defects. Relationship of strength properties to those required in service. Alloy content of foreign and domestic steels. Tables and diagrams. (F22, D9, Q23, ST)

218-F. (German.) **Influence of Manufacturing Conditions on Properties of Large Forgings for Steam Turbines.** Rudolf Schinn. *Stahl und Eisen,* v. 72, June 5, 1952, p. 676-683; disc., p. 683.

Influence of size of ingot, degree and kind of forging on properties. Significance of chemical composition. Heat treatment and quenching and resulting stresses. Mechanical and ultrasonic testing. Tables, diagrams, graphs, and micrographs. 31 ref.
(F22, D9, J26, Q general, S13, ST)

219-F. (German.) **Forging Manipulators.** Walter Knackstedt. *Stahl und Eisen,* v. 72, June 5, 1952, p. 668-675.

U. S. and German types, their installation and use. Diagrams, tables, and illustrations. (F22)

220-F. Upset Blades. *Aircraft Production,* v. 14, July 1952, p. 227-229.

Application of Omes electroforging process to production of gas-turbine rotor and stator types. The material is heated by a low-voltage current passed through the billet itself. Passage of current is confined to the portion of the bar which is to be upset and forged. Diagrams and illustrations. (F22)

221-F. The Ugine-Sejournet Extrusion Process. Jerome Strauss. *American Iron and Steel Institute,* Preprint, 1952, 15 pages.

Process developed by a French firm for extrusion of complex shapes in ferrous and nonferrous metals and alloys. A glass-fiber sheath serves as the lubricant. (F24)

222-F. An Examination of Modern Theories of Rolling in the Light of Rolling Mill Practice. (Continued.) N. H. Polakowski. *Sheet Metal Industries,* v. 29, July 1952, p. 581-586, 594.

Forward slip in rolling; effect of tension on forward slip; and relations between draft, forward, and backward slip. Data for carbon-steel strip. Diagrams and table. 12 ref. (To be continued.) (F23, CN)

223-F. Rammed Shell Cases. *Steel,* v. 131, July 14, 1952, p. 90.

How Army Chemical Corps' fast-ramming method produces mortar and gas shells from seamless steel tubing in 22 sec. per shell. (F26, ST)

224-F. Drawing of Aluminum Wire. J. S. Urbanik. *Wire and Wire Products,* v. 27, July 1952, p. 676-677, 711.

History and present practice in the U. S. and abroad. (F28, Al)

225-F. (Book) **Tube Producing Practice.** 107 pages. 1951. American Institute of Mining and Metallurgical Engineers, 29 W. 39th St., New York 18, N. Y. (Institute of Metals Div., Symposium Series, Vol. 4.)

An introductory paper which interprets the theory of tube-producing methods in terms of practical problems is followed by a number of papers on practices found in individual metal industries. The particular industries treated differ somewhat from those described in previous symposia. For the first time in the series, lead is discussed and the ferrous industry is described. Individual papers are separately abstracted. (F26)

226-F. (Book) **Die Berechnung der Kräfte und des Kraftbedarfes bei der Formgebung in bildsamen Zustande der Metalle.** (The Calculation of Forces and Power Requirements in Plastic Forming of Metals.) Alexander Geleji. 248 pages. 1952. Akademiai Kiado, Budapest, Hungary. 40 Forint.

Written for designers of metal-forming machinery. Chapters cover forging and pressing; flat rolling; rotary piercing and Pilger rolling; wire, bar, and tube drawing; hot extrusion; plate binding; and deep drawing. (F general, G4)

227-F. How Draw Speed Affects Stainless Wire. Samuel Storchheim. *American Machinist,* v. 96, July 21, 1952, p. 124-125.

Effects of draw speed on coercive force, remanence, ultimate tensile strength, and electrical resistivity of Types 302 and 304 stainless steel wires. Tables and graphs.
(F28, P15, P16, Q27, SS)

228-F. High Alloy Metals Hot Extruded. *Canadian Metals,* v. 15, July 1952, p. 20-21.

See abstract of "Fiberglass Sheath the Secret: New Metnod Makes Stainless Extrusion Practical," *Steel;* item 171-F, 1952. (F24, SS, Mo, Ti)

229-F. Developments in D-C Drives for Hot Strip Mill Runout Tables and Coilers. H. E. Larson. *Iron and Steel Engineer,* v. 29, July 1952, p. 55-76; disc., 76-77.

The 14 years of experience of General Electric Steel Mill Division. Tabulated data; circuit diagrams, photographs, and graphs. (F23, ST)

230-F. Discussion on the Paper—Cooling Beds for Bar Mills. *Journal of the Iron and Steel Institute,* v. 171, June 1952, p. 183-189.

A discussion, with author participation, of the above paper (Nov. 1951 issue; item 18-F, 1952). Graph. (F23, ST)

231-F. Width Gage for Hot Strip Rolling Mills. E. S. Sampson. *Proceedings of the National Electronics Conference,* v. 7, 1951, p. 341-351.

Described, diagrammed, and illustrated. (F23, S14)

232-F. Soaking Pit Covers Poured With Castable Refractory. W. B. Smith. *Steel,* v. 131, July 21, 1952, p. 100, 103.

Pouring procedure. Poured pit covers have a life from 7 months to 2 years. (F21)

233-F. (French.) **New Rolling Mills for Production of Thin Sheets of Aluminum.** M. Coquand. *Revue de l'Aluminium,* v. 29, June 1952, p. 235-238.

Equipment of a French firm. (F23, Al)

234-F. (French.) **Ferblatil—a Modern Plant for Cold Rolling and Electroplating.** Michel Gevers. *Revue Universelle des Mines, de la Métallurgie des Travaux Publics, des Sciences et des Arts appliqués, a l'Industrie,* ser. 9, v. 8, June 1952, p. 212-228.

The plant, and its manufacturing processes, such as sheet steel cold rolling, pickling, machining, and electroplating. Micrographs. (F23, G17, L12, L17, ST)

235-F. (German.) **Productivity Increase in the Drawing of Bars Using Infinitely Variable Speed Control.** Fritz Boehm. *Stahl und Eisen,* v. 72, July 3, 1952, p. 797-804.

Results of a comprehensive experimental and theoretical investigation. Graphs. (F27, ST)

236-F. (German.) **Economic Lot Sizes for Work on Special Machines for Wire Processing.** Joseph Billigmann. *Stahl und Eisen.* v. 72, July 3, 1952, p. 833-837; disc., p. 837-838.

Effect of lot size on costs of fabrication and minimum number of pieces when using special machines. Charts for use in such calculations, also specific applications. (F28)

237-F. (German.) **The Effect of Additions on the Extrudability of Cable Lead.** Arnold Loeschmann. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 5, June 1952, p. 219-223.

Comparative experiments show that solid-solution-forming elements (such as Sb and Sn) impede the recrystallization of cable lead less than highly dispersed insoluble additions (such as Cu, Te, Al, and Ca), and that solid-solution-forming elements increase the required extrusion pressure, while soluble alloy additions have little effect on it. Diagrams, graphs, tables, and photographs. (F24, Q24, Pb)

238-F. Pierce, Draw Hollow Steel Forgings to 13 Tons. *American Machinist.* v. 96. Aug. 4, 1952, p. 146-147.

Heavy-wall steel forgings are being produced by a pierce-and-draw method using a graphite lubricant. Developed by Babcock & Wilcox primarily to produce headers for high-pressure steam-generating equipment, the method is expected to provide an economical means of producing accumulators, pressure vessels, heat exchangers, large bearing races, and other hollow forgings. (F22, F26, G1, ST)

239-F. Tube Manufacture; the Bronx Continuous Forming and Welding Machine. *Automobile Engineer,* v. 42, July 1952, p. 271-272. (F26)

240-F. Wax Comes to the Metal Shop. *Business Week,* Aug. 2, 1952, p. 85-86.

Use as metalworking lubricant. (F1, G21)

241-F. Cold Rolling With Strip Tension. Part II. Comparison of Calculated and Experimental Results. F. Ellis, D. R. Bland, and H. Ford. **Part III. An Approximate Treatment of Elastic Compression of the Strip in Cold Rolling.** *Journal of the Iron and Steel Institute,* v. 171, July 1952, p. 239-249.

Part II: The approximate method of calculating roll force and roll torque is compared with the experimental results of Hessenberg and Sims. Part III: Approximate equations are derived for the contributions to the roll force and torque from those parts of the roll gap in which the strip is only elastically compressed. Tables and graphs. 12 ref. (F23)

242-F. The Manufacture of Reinforced Steel Tubing. E. Hörmann. *Engineers Digest,* v. 13, July 1952, p. 225-226. (Translated and condensed from *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, Apr. 21, 1952, p. 343-345.

Steel tubes may be reinforced or flanged by upsetting under heat. Local induction heating is recommended. Manufacture of internal reinforcements. Tensile strength of 24-ton steel at elevated temperatures. (F26, ST)

243-F. Steel Tube Production by Electric Resistance Welding. *Engineer,* v. 194, July 18, 1952, p. 94-95.

Abstracted under similar title from *Railway Gazette,* item 244-F, 1952. (F26, ST)

244-F. Tube Manufacture by Electric Resistance Welding. *Railway Gazette,* v. 97, July 18, 1952, p. 70-73.

Equipment and procedures of British firm. (F26, ST)

245-F. Thicker Boiler Plate Formed Faster. *Steel,* v. 131, Aug. 11, 1952, p. 84-87.

New vertical press and horizontal draw bench at Babcock & Wilcox Co.'s Barberton, Ohio, plant which produce rough hollow forgings up to 35 in. o.d. with 4½-in. walls. (F22, F26, G1, CN)

246-F. (German.) **New Methods for Manufacture and Use of Aluminum-Sheathed Cables.** K. H. Hahne. *Aluminium,* v. 28, July-Aug. 1952, p. 230-237.

Apparatus and procedures for production of the above. Diagrams and illustrations. (F28, T7, Al)

247-F. (German.) **New Results of Rolling Research and Their Application to Rolling Practice in Hot and Cold Rolling of Metals, Particularly Aluminum-Base Light Alloys.** O. Emicke. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 18, June 1952, p. 189-206.

Large-scale experiments on the cold rolling of copper, brass, aluminum, and duralumin, and on deep drawing strip steel, for the purpose of finding reliable and simple bases for calculation of rolling processes. Data are extensively charted. 13 ref. (F23, Cu, Al, ST)

248-F. (German.) **Practical Problems of Steel for Sheet and Strip.** Erich Schauff. *Stahl und Eisen,* v. 72, July 17, 1952, p. 892-898.

Qualities of thickness uniformity, surface finish, and deformability of sheets required by the metalworking industries; effects of composition; statistical analyses of essential elements, oxides, and other nonmetallic inclusions in the steel; and killed vs. rimming steel. Tables, graphs, and photomacrographs. (F23, ST)

249-F. Forged Skin-Panels: Development of Technique for the Production of Integrally-Stiffened Aircraft Units. Part I. Design Considerations; Forging Principles; Die-Design. Part II. *Aircraft Production,* v. 14, June 1952, p. 191-197; Aug. 1952, p. 261-268.

Work in the U. S. by Lockheed Aircraft Corp., U. S. Air Force, and Wyman-Gordon Co. Al alloy is used. (F22, Al)

250-F. Wide Strip Mills—Evolution or Revolution? Frank H. Fanning. *Blast Furnace and Steel Plant,* v. 40, Aug. 1952, p. 913-920.

Reviews history. Effects on productive capacity and other economic gains. Illustrations show results of cupping tests and microstructure of annealed sheets produced in different ways, also automobile-body parts made from them. (To be continued.) (F23, CN)

251-F. South Africa Now Has Modern Steel Plant. *Blast Furnace and Steel Plant,* v. 40, Aug. 1952, p. 933-934.

Plant of South African Iron & Steel Industrial Corp. Emphasizes rolling mills. (F23, ST)

252-F. Novel Press Setups Produce Cold-Drawn, Hot-Forged Parts. A. B. Mooers. *Iron Age,* v. 170, Aug. 14, 1952, p. 130-133.

Unusual setup used by Buick Motors Div. to turn out a rear-axle housing flange. SAE 1008-1020 hot drawn plate blanks are tumble blasted before drawing. All cold operations except blanking are done in four dies mounted in one Toledo 96-B press. A Surface Combustion rotary furnace heats the partly formed parts in a scale-inhibiting atmosphere. Hot working is completed in a 1300-ton Ajax forging press. A six-man team turns out 365 parts per hr. (F22, G1, CN)

253-F. Controls Ease Precision Tube Problems. Paul V. Fly. *Steel,* v. 131, Aug. 18, 1952, p. 94-95.

Production of stainless tubing in sizes from 0.010 to 0.625-in. o.d. calls for close control of all operations—cold drawing, de-rodding, and annealing. Procedures and equipment of Tube Methods, Inc., Bridgeport, Pa. (F26, J23, SS)

254-F. The Perfect Profile—a Yardstick. Frances Mortimer. *Wire and Wire Products,* v. 27, Aug. 1952, p. 783-784, 827.

Method of measuring wiredrawing die bores using the instrument developed by BISRA. Faults in die construction. (F28, S14)

255-F. (Book) **Steel Wire in America.** Kenneth B. Lewis. 351 pages. Wire Association, Stamford, Conn. $15.00.

Raw materials, rods, pickling, acids, inhibitors, nails, galvanizing, and other phases. History, metallurgy of plastic flow, biographies of present-day personalities in the industry, die history, and stress theories. (F28)

256-F. Heat Exchangers Require Precise Fabrication. F. A. Guba. *Iron Age,* v. 170, Aug. 21, 1952, p. 127-129.

Basic factors in successful tube expanding: Tube characteristics,

tube-sheet characteristics, tube and tube-sheet preparation, workmanship, and physical properties of steel used. (F26, ST)

257-F. The Rendleman Rod Mill. Norman Rendleman and A. Wilson. *Iron and Steel Engineer,* v. 29, Aug. 1952, p. 77-83; disc., p. 83.

Rod mill is essentially a 3-strand mill with three lines employed to roll 400, 500, or 600-lb. billets into any size of rod. In operation, the mill approaches the equivalent of three single-strand mills. Fundamental components are organized in a new and highly advantageous way. Details are illustrated diagrammatically. (F23, ST)

258-F. New Magnesium Rolling Mill Starts Operation. *Magazine of Magnesium,* Aug. 1952, p. 4-5.

Picture story of Brooks & Perkins Livonia Mill Div. (F23, Mg)

259-F. The Deformation Through the Die by Drawing of a Rod. Hiroshi Yamanouchi and Ikuhiko Hayashi. *Reports of the Casting Research Laboratory,* No. 3, 1952, p. 61.

Research on four steel test pieces through a steel die having different die angles with three components of linear natural strain and additional shear strain. Shear-stress diagrams. (F27, Q24, CN)

260-F. An Examination of Modern Theories of Rolling in the Light of Rolling Mill Practice. IV. Theory and Practice of Tension and Gauge Control in Modern Production Mills. N. H. Polakowski. *Sheet Metal Industries,* v. 29, Aug. 1952, p. 709-715.

Includes schematic and circuit diagrams. 23 ref. (F23)

261-F. Details of a New High Precision Hot Rolling Line Installed at Sandvikens Jernverks AB. *Sheet Metal Industries,* v. 29, Aug. 1952, p. 717-722.

Swedish mill for high-carbon and stainless steels. Diagrams and illustrations. (F23, CN, SS)

262-F. The ABC of Extrusion. Andrew E. Rylander. *Western Machinery and Steel World,* v. 43, Aug. 1952, p. 104-107.

Basic elements and several methods in current use. Schematic sketches and drawings of tooling for typical applications. (F24, G5)

263-F. (German.) **Friction Caused by Roll Pressure Corresponding to Various Elasticity Moduli.** Alfred Shäfer. *Archiv für das Eisenhüttenwesen,* v. 23, July-Aug. 1952, p. 253-256.

Proposes mathematical calculation for the boundary case of complete adhesion, and for the case of medium adhesion range, and for the final stages of flow. Theoretical results are verified by photo-elastic experiments. Graphs. (F23, Q24)

264-F. (German.) **Rolling Program and Rolling Diameter in Cold Rolling of Brass Strip and Plate. Part I.** Karl-Heinz Lucas and Otto Emicke. *Metall,* v. 6, Aug. 1952, p. 417-426.

Continuous cold-rolling processes. Advantages of modern methods. Tables and graphs. (F23, Cu)

265-F. Pair Forging Makes Giant Rotor Disks. *American Machinist,* v. 96, Sept. 1, 1952, p. 138-139.

Problems which faced Bethlehem Steel in producing rotor disks for NACA's new supersonic wind tunnel. Operations. (F22, ST)

266-F. The Measurement of Strip Tension in Tandem Mills. R. B. Sims. *Engineering,* v. 174, Aug. 22, 1952, p. 232-233; Aug. 29, 1952, p. 262-264.

Includes diagrams, photographs of apparatus, and tables. (F23, ST)

267-F. Strip Rolled to 0.0002 In. on New Small Mill. Robert L. Stockus. *Iron Age,* v. 170, Sept. 4, 1952, p. 156-159.

New and unique rolling mill developed by the Armzen Co., Waterbury, Conn., which will cold roll electrical alloys to 0.0002 in. (F23)

268-F. Giant Rotor Forgings Hard to Handle. *Iron Age,* v. 170, Sept. 11, 1952, p. 88.

See abstract of "Pair Forging Makes Giant Rotor Disks." *American Machinist,* item 265-F, 1952. (F22, ST)

269-F. The New Heavy Forge at Hadfields, Ltd. *Journal of the Iron and Steel Institute,* v. 171, Aug. 1952, p. 413-419.

Description and layout diagrams. (F22, CN)

270-F. B & W's Giant Press Forms Heavy Plate, Pierces Ingots for Hollow Forgings. *Journal of Metals,* v. 4, Sept. 1952, p. 922-923.

Operation of the press. (F22, G1, ST)

271-F. Diamond Wire-Drawing Dies. R. E. Leeds. *Metal Industry,* v. 81, Aug. 22, 1952, p. 147-148.

Steps in making the dies and a method for reducing time of piercing by 50 to 1. An electric spark is used. Photographs and diagrams. (F28)

272-F. Impact Forging Strong Aluminum Alloys. R. A. Quadt. *Modern Metals,* v. 8, Aug. 1952, p. 43-44.

New process called cold-impact forging now employed at Riverside, Calif., plant of Hunter Douglas Corp. (F22, Al)

273-F. High-Geared Production With Induction Heating. *Steel,* v. 131, Sept. 8, 1952, p. 88-92.

Increased output in forging of transmission gears is achieved by conversion to induction heating at Chevrolet Saginaw Transmission Div. (F22, ST)

274-F. Wide Strip Mill Opens World of New Ideas. Frank H. Fanning. *Steel,* v. 131, Sept. 8, 1952, p. 100, 102, 104.

See abstract of "Wide Strip Mills —Evolution or Revolution?" *Blast Furnace and Steel Plant,* item 250-F, 1952. (F23, CN)

275-F. Design of Forging Press Die Bolsters. E. W. Mace. *Steel Processing,* v. 38, July 1952, p. 335-339; Aug. 1952, p. 385-387.

Desirable points sought in die-bolster design. Schematic drawings. (F22, T5)

276-F. New Furnaces Installed for Shell Forging Work. Arthur Q. Smith. *Steel Processing,* v. 38, Aug. 1952, p. 396-398.

See abstract of "Forging and Heat Treating of Shells is Speeded by Newest Equipment", *Industrial Gas,* item 145-F, 1952. (F21, J general, ST)

277-F. From Ingots to Steel Pipes. *Welding Engineer,* v. 37, Sept. 1952, p. 36-38.

Manufacture of welded steel pipes from ore to finished product at Wheeling Steel Corp. Photographs show steps in the procedure. (F26, CN)

278-F. Calculating Aids in Wire Drawing. Karl Schimz. *Draht* (Wire) (English Ed.), July 1952, p. 31-35.

Numerical examples and nomograms. (F28)

279-F. (Japanese.) **Research on Back-Tension Wiredrawing.** Hiromu Suzuki. *Report of the Institute of Industrial Science, University of Tokyo,* v. 1, No. 3, Dec. 1950, p. 73-118.

Rheological characteristics of deformation caused by drawing, mechanical properties of drawn wires, and mechanical characteristics of wiredrawing machines. Graphs and diagrams. (F28, Q24)

280-F. Accurate Methods—Precision Tubes. Paul V. Fly. *Instrumentation,* v. 6, 3rd. qtr., 1952, p. 17.

Previously abstracted from *Steel;* see item 253-F, 1952. (F26, J23, SS)

281-F. Strip and Wire Drawing; a Simple Account of Modern Theory. J. G. Wistreich. *Iron & Steel,* v. 25, Sept. 1952, p. 391-395.

Some features of modern plasticity theory covering such topics as work hardening and equivalent mean strain; effect of friction; strip-drawing theory; and wire-drawing theory. Graphs. (F23, F28, Q23)

282-F. Drop-Forging Practice in Australia. H. J. Merchant. *Metal Treatment and Drop Forging,* v. 19, Aug. 1952, p. 335-341.

Survey of progress plus a description of drop-forging facilities and practices of Australian Forge and Engr. Pty., Ltd., Sydney, N. S. W. (To be continued.) (F22)

283-F. The Development and New Applications of Cold-Flow Pressing of Steel. Karl Sieber. *Draht* (Wire) (English Ed.), July 1952, p. 26-30.

Previously abstracted from *Machinery* (London); see item 167-F, 1952. (F22, F24, ST)

284-F. (German.) **The New Roughing Mill of the Steel Plant at Donawitz.** Othmar Kammerhofer. *Stahl und Eisen,* v. 72, Aug. 14, 1952, p. 1025-1034.

Details described, diagrammed, and illustrated. Data are tabulated. (F23, ST)

285-F. (Italian.) **Reviewing the Modern Production of Hot Rolled Strip on Continuous Mills.** Marco Gatti. *Metallurgia Italiana,* v. 44, July 1952, p. 251-258.

Recent developments, particularly in the U. S. Equipment is diagrammed. (F23, ST)

286-F. (Book—German.) **Was der Mann aus der Schiede von seiner Arbeit wissen muss.** (What the Man in the Forge Shop Must Know About His Work.) A. Schwartz. 126 pages. Stahleisen m.b.h., Düsseldorf, Germany, 7.20 DM.

An intensely practical book, which covers almost all of the operations performed in a forge shop. Each operation is illustrated by one or more sketches so clear that the text can almost be dispensed with. Deals not only with the forging operations proper, but with furnace practice, with crane operation, and with health and safety. (From review in *American Machinist.)* (F22)

287-F. Machines for Cold Forming Strip. Carl Hölzer. *Machinery* (London), v. 81, Sept. 4, 1952, p. 428-434. (Reprinted from *Werkstattstechnik und Maschinenbau.)*

German machines for manufacture of straight, open, and closed sections; universal section rolling machines; section draw benches; production of formed rings and segments; truing and stabilizing; and contracting and expanding. Welding is performed in some of the machines. (F23, G4, K general)

288-F. Dodge Automates Press Forging. Ruper Le Grand. *American Machinist,* v. 96, Sept. 29, 1952, p. 123-126.

See abstract for "Continuous Press Forging Applied to Crankshafts",

Joseph Geschelin, *Automotive Industries,* item 289-F, below. (F22, ST)

289-F. Continuous Press Forging Applied to Crankshafts. Joseph Geschelin. *Automotive Industries,* v. 107, Oct. 1, 1952, p. 58-59.

New Dodge Forge Plant of Chrysler Corp. (F22, ST)

290-F. Titanium Forgings. *Electrical Manufacturing,* v. 50, Oct. 1952, p. 302, 304, 306.

Problems encountered in forging Ti parts. (F22, Ti)

291-F. Heating Steel Bars for Continuous Hot Heading Operations. *Industrial Heating,* v. 19, Sept. 1952, p. 1614, 1616, 1618, 1620.

A rapid-heating, continuous, conveyerized end-heating forge used at Chicago Screw Co., Ballwood, Ill. for carbon and alloy steels. It was designed by Sunbeam Corp., Chicago. (F21, CN, AY)

292-F. Automated Forging Line Boosts Output, Cuts Costs. W. G. Patton. *Iron Age,* v. 170, Oct. 2, 1952, p. 93-96.

Automated crankshaft forging line at Dodge Div., Detroit, which has virtually eliminated manual handling in production of semifinished crankshafts from SAE 1045 steel billets. Big units in this unusual line are a Hagan rotary furnace which handles 300 billets per hr. and a 6000-ton Ajax forging press said to be largest forging press automakers are using. (F22, ST)

293-F. Producing Large Diameter Pipe to Exacting Specifications. *Iron Age,* v. 170, Sept. 25, 1952, p. 118-121. (A condensation.)

Procedures at A. O. Smith Corp., Milwaukee. Steel pipe, 8⅝ to 36 in. diam., is produced in 40-ft. lengths at rate of 90-100 pieces per hour. Press capacities range to 11,000 tons. Flash resistance welding is used. Mechanical properties, inspection, and quality control. (F26, S general, ST)

294-F. Large Forgings Will Slash Fabrication Costs. *Iron Age,* v. 170, Sept. 25, 1952, p. 128-130.

Aircraft industry analyses show how much will be gained through availability of large forgings, such as the huge presses the air force is sponsoring can produce. They will permit weight reductions, reduction of assembly labor and equipment costs, reduced machining requirements, and greater structural strength. (F22)

295-F. Discussion at the Annual General Meeting, 1952: "Cold Rolling". *Journal of the Iron and Steel Institute,* v. 172, Sept. 1952, p. 28-40.

Joint discussion on the following papers: "Cold Rolling With Strip Tension. Part I. A New Approximate Method Calculation and a Comparison With Other Methods", H. Ford, F. Ellis, and D. R. Bland; "Effect of Tension on Torque and Roll Force in Cold Strip Rolling", W. C. F. Hessenberg and R. B. Sims; "Pressure Distribution Between Stock and Rolls in Hot and Cold Flat Rolling," C. L. Smith, F. H. Scott, and W. Sylwestrowicz; and "Softening of Metals During Cold Working", N. H. Polakowski. Diagram. 27 ref. (F23, CN, AY, Cu)

296-F. Bethlehem Forges Giant Rotor Disks. *Journal of Metals,* v. 4, Oct. 1952, p. 1032.

Rotor disks for compressors in supersonic wind tunnels are 18 ft. diameter, 9 in. thick, and weigh almost 50 tons. Forging operations. (F22, ST)

297-F. Babcock & Wilcox Installs Nation's Largest Press for Forming Boiler Drums. *Marine Engineering and Shipping Review,* v. 57, Oct. 1952, p. 64-66.

See abstract of "Pierce, Draw Hollow Steel Forgings to 13 Tons", *American Machinist;* item 238-F, 1952. (F22, F26, G1, ST)

298-F. Interview With an Independent Aluminum Extruder. *Modern Metals,* v. 8, Sept. 1952, p. 37-38, 40-41.

A return-visit interview to obtain information on current outlook of precision extrusions. (F24, Al)

299-F. Details of Modernization of Certain Rolling Mills in France and Belgium. *Sheet Metal Industries,* v. 29, Sept. 1952, p. 773-783.

The works reviewed are: the Forges de Leval-Aulnoye; Phenix Works, Liege; and Ferblatil (S. A. John Cockerill). Annealing and tinplate cleaning facilities are also dealt with for the last company. Flow and other diagrams, table and photographs. (F23, J23, L17, ST)

300-F. New Forging Twist Crankshaft Output Tripled. H. C. Tuttle. *Steel,* v. 131, Sept. 29, 1952, p. 78-81.

See abstract, "Continuous Press Forging Applied to Crankshafts", Joseph Geschelin, *Automotive Industries,* item 289-F, above. (F22, ST)

301-F. One Way to Handle a Big Forging Job. *Steel,* v. 131, Oct. 6, 1952, p. 76-77.

See abstract of "Bethlehem Forges Giant Rotor Disks", *Journal of Metals;* item 296-F, 1952. (F22, ST)

302-F. Tube Company Expands Facilities, Adds New Forming Equipment. *Steel Equipment & Maintenance News,* v. 5, Sept. 1952, p. 14-15.

See abstract of "Pierce, Draw Hollow Steel Forgings to 13 Tons", *American Machinist;* item 238-F, 1952. (F22, F26, G1, ST)

303-F. Big Business From Little Springs. *Western Machinery and Steel World,* v. 43, Sept. 1952, p. 83-85.

New location and plant facilities of the Connor Spring Mfg. Co., where various sized springs are made. Materials used are music wire, oil tempered MB wire; oil tempered wire, valve spring quality; hard-drawn MB wire; Cr-V wire; stainless steel wire; phosphor bronze wire; beryllium copper; spring brass; and Inconel. Includes drawing, heat treatment, and coating of springs. (F28, T7, SG-b)

304-F. Swage It And Cut Costs. Andrew E. Rylander. *Western Machinery and Steel World,* v. 43, Sept. 1952, p. 96-99.

Machinery for swaging applicable to phosphor bronze bushings, cast iron, soft steel, and most nonferrous metals. (F22)

305-F. Changes in the Processes and Products of the Tin Plate Industry: I. Charles A. Ferguson. *Industrial Heating,* v. 19, Aug. 1952, p. 1437-1438, 1440, 1442, 1444, 1446, 1448, 1450, 1452.

Evolution of the process of producing tinplate from its beginning in England through its development in this country. Conversion from hand rolling and hand pickling to the present continuous rolling and pickling operation. Future possibility of using direct-cast wide flats. (To be continued.) (F23, L12, CN, Sn)

306-F. Some Friction Effects in Wire Drawing. G. D. S. MacLellan. *Journal of the Institute of Metals,* v. 81, Sept. 1952, p. 1-13.

Theoretical discussion which formulates a generalized version of Sach's theory, to allow for effect of a cylindrical extension to a conical die channel, commonly called a "parallel". Some previously published results are correlated to this analysis. Concludes that "parallels" have an appreciable effect on drawing force, and that allowance must be made for their effect in derivation of friction from back-pull experiments. Diagrams and photographs. 21 ref. (F28)

307-F. High-Speed End Heating of Sucker Rods for Upsetting. D. R. Dale. *Metal Progress,* v. 62, Oct. 1952, p. 115-117, 194.

Specially designed slot furnace using high-speed gas heating for forging of oil well sucker rods. Diagram and photograph. (F1, ST)

308-F. Drop-Forging Practice in Australia. (Concluded.) H. J. Merchant. *Metal Treatment and Drop Forging,* v. 19, Sept. 1952, p. 405-411, 417.

Production organization, inspection control and maintenance of machines at Australian Forge and Engr. Pty., Ltd., Sydney, N. S. W. works. Some of the methods of production, together with production rates. Future expansion of drop forging industry "Down-Under". Diagrams and photographs. (F22)

309-F. The Forward Slip in Cold Strip Rolling. R. B. Sims. *Sheet Metal Industries,* v. 29, Oct. 1952, p. 869-877.

Measurements obtained during experimental research to determine effect of combined strip tensions on roll force and torque. Experimental results for carbon steel and copper are compared with two theoretically derived equations for forward slip with and without applied tensions. An alternative and simpler method of computation is also proposed for case of rolling with tensions, based on a semi-empirical relationship. Table and graphs. (F23, CN, Cu)

310-F. Model Forging Experiments; The Use of Plasticine. F. Mortimer. *Iron & Steel,* v. 25, Oct. 1952, p. 433-436.

Use of colored wax to study the processes of forging and stamping. Plasticine resembles metals in its stress-strain curve and in its constancy of volume under plastic flow. Diagrams and illustrations. (F22, ST)

311-F. Small Two-High Reversing Mills for the Rolling of Semi-Finished Products. Edwart T. Peterson, Lewis W. King, and Edward C. Peterson. *Iron and Steel Engineer,* v. 29, Oct. 1952, p. 69-77.

Trend toward increased use of small and very large mills. Large units are used for C and low-alloy steels, and wide stainless slabs, while increased use of the smaller mills is explained by a corresponding increase in size of ingots of high alloy, stainless, and toolsteels referred to as "specialty steels". (F23, AY, TS, SS)

312-F. Avoiding Trouble in Soaking Pit Operation. D. J. McGeary. *Iron and Steel Engineer,* v. 29, Oct. 1952, p. 92-94; disc., p. 94-96.

Retarded production as a result of "nothing hot"; delays and quality deterioration due to lack of more complete heating and soaking. (F21, ST)

313-F. A New Hot Mill for Strips Up to 24 in. Wide. M. Langen. *Journal of the Iron and Steel Institute,* v. 172, Oct. 1952, p. 203-214.

Arrangement, design, and performance. (F23, ST, EG-a)

314-F. Electric Drives for Continuous Hot Mills. G. R. Wilson. *Journal of the Iron and Steel Institute,* v. 172, Oct. 1952, p. 215-225.

Reasons for some of the selections made. Drives using one motor per mill and one motor per stand. Typical curves show relative motor performance with different forms of control system. Converting plant for supplying d.c. motors. Comparisons between motor-genertor sets and mercury-arc rectifiers. (F23, ST, EG-a)

315-F. Aluminium Sheathed Cables. *Metal Industry,* v. 81, Oct. 3, 1952, p. 265-267, 271.

Manufacture and use for replacement of lead cable sheaths. Use of pre-extruded tube; swaging and sinking operations. Photographs and diagrams. (F26, T1, Al)

316-F. Dodge Forge Introduces a "First" in the Forging Industry. John C. McComb. *Steel Processing,* v. 38, Oct. 1952, p. 497-502, 517-518, 523.

An automatic production line installed for the press forging of automotive crankshafts in which the billet stock, after being sheared, is heated and preformed without being touched until it arrives at the forging press. Photographs and diagrams. (F22, CN)

317-F. ACSR Wire. Frank E. Weise, Jr. *Wire and Wire Products,* v. 27, Oct. 1952, p. 1023-1026, 1130-1131.

Control practiced in production of galvanized steel wire. Tables and diagrams. (F28, L16, CN, Zn)

318-F. The Control of Wire Drawing Solutions for Copper. Robert C. Williams. *Wire and Wire Products,* v. 27, Oct. 1952, p. 1032-1033.

Recommended practices for proper makeup of solution, means of measuring its strength, control of temperatures, and pH range. (F1, Cu)

319-F. (French.) **Progress Made in the Manufacture of Refinery Furnace Tubes.** Jean Dauvergne. *Third World Petroleum Congress, Proceedings,* sec. VIII, 1951, p. 1-12; disc., p. 43-49.

Special French techniques. Standardization. Hydrogen absorption and removal. Determination of hydrogen in liquid steel. Stress and torsion studies at elevated temperatures. Extrusion and creep studies. Welding. Photographs, and micrographs. (F26, Q general, T29, SS, AY)

320-F. (German.) **Lubricant Carriers for Drawing Steel Wire of Low and High Carbon Contents.** Werner Lueg and Karl-Heinz Treptow. *Stahl und Eisen,* v. 72, Sept. 25, 1952, p. 1207-1212.

The various types and requirements to be met. Production, composition, properties, and applications of lime; properties, applications, and advantages of borax over lime; development of other alkaline carrier materials; and use of graphite for special applications. 31 ref. (F1. F28, ST)

321-F. (German.) **Boundary-Friction Lubricants.** Martin Kühn. *Stahl und Eisen,* v. 72, Sept. 25, 1952. p. 1212-1216.

The theoretical fundamentals of lubrication are deduced from practical experiments and chemical characteristics of the lubricants. Relationships between lubricant and carrier in wire drawing. Theories of chemical composition and physical behavior of lubricants. (F1, F28)

322-F. (German.) **Predetermination of Power, Work, and Output Required for Cold Upsetting.** Joseph Billigmann. *Stahl und Eisen,* v. 72, Sept. 25, 1952, p. 1221-1230.

General formulas for power and work required, standard values for deforming strength and resistance, effect of shape of bolt head in cold upsetting, factors to represent effect of material, simplified formulas to predetermine upsetting pressure, work, and output. Diagrams and tables. (F22, ST)

323-F. (German.) **Straightening Rolled Products.** Erich Siebel. *Stahl und Eisen,* v. 72, Oct. 9, 1952, p. 1298-1301.

Stresses and deformations in elastic bending and when stressed above the elastic limit. Straightening of various products and by various methods. Illustrations and charts. (F29)

324-F. (German.) **The Metallography of Light Metals. III. Formation of Structure in Wire Drawing.** H. Kostron. *Metall,* v. 6, Oct. 1952, p. 590-597.

Extruded, drawn, and hardened Al-Cu-Mg wire was investigated for the effect of the various operations on grain size, grain-size distribution, and strength of wire. Photomicrographs, tables, and graphs. 14 ref. (F28, M27, Q23, Al)

325-F. Forged Skin-Panels. Part 3. Progressive Forging of Panels; Suck-In Effect; Investigation and Analysis of Test-Panels. *Aircraft Production,* v. 14, Nov. 1952, p. 373-376.

Describes tests and tabulates data. 75S, 14S, and Dow FS alloys were investigated. (F22, Al, Mg)

326-F. Progress Made in Heavy Forge-Press Art. Irving Stone. *Aviation Week,* v. 57, Nov. 17, 1952, p. 50-52, 54, 56, 59-60.

General discussion with illustrations. Emphasis on work with 18,000-ton press being operated by Wyman-Gordon Co. for U. S. Air Force, on Al and Mg airframe components. (F22, Al, Mg)

327-F. Rolls and Rolling. Part XXXII. Rails. E. E. Brayshaw. *Blast Furnace and Steel Plant,* v. 40, Nov. 1952, p. 1311-1318.

Pass-design standardization. Roll designs. (F23)

328-F. New Automatic Unit Makes Drop Forgings in Mid Air. *Iron Age,* v. 170, Nov. 13, 1952, p. 155-157.

Problems, applications, and future use of method which consists of holding a blank in mid-air and having two horizontal die-holders strike it simultaneously from opposite directions. (F22)

329-F. Sheathing Cable With Aluminium. *Metallurgia,* v. 46, Oct. 1952, p. 175-178.

Johnson and Phillips process, which consists of threading the cable core through an aluminium tube, followed by swaging and sinking. (F25, Al)

330-F. Swaged Housing Ring Grooves to Retain Axial Thrust Bearing. C. H. Avery and A. G. Brisack. *Product Engineering,* v. 23, Nov. 1952, p. 149-152.

Design criteria for retaining bearings in housing by means of a lip roll swaged around circumference of housing bore. Results of an investigation that included press swaging, friction spin swaging, and roll swaging of both ductile and notch sensitive materials. Tests were conducted on 24SO, 75SO, and 75ST Al; and on FS-lh Mg. Micrographs and diagrams. (F25, T7, Al, Mg, SG-c)

331-F. An Examination of Modern Theories of Rolling in the Light of Rolling Mill Practice. N. H. Polakowski. *Sheet Metal Industries,* v. 29, Nov. 1952, p. 965-970, 978.

Rotating regulator-amplifiers, and their application for tension reel control, inertia effects in variable speed drives and effects of I.R. drop and I.R. drop compensation. (F23, S18)

332-F. New Squeeze on Steel. Richard Cheney. *Steelways,* v. 8, Nov. 1952, p. 20-23.

Adaptation of French hot-extrusion process to American industry. Photographs and diagrams. (F24, ST)

333-F. (Book) **Cold Working of Non-Ferrous Metals and Alloys.** 207 pages. 1952. Institute of Metals, 4 Grosvenor Gardens, London, S.W.1, England.

Includes five papers comprising a symposium on metallurgical aspects of following subjects: fundamental aspects of cold working of nonferrous metals; cold rolling of nonferrous metals in sheet and strip form; wiredrawing technique and equipment; deep drawing and pressing of nonferrous metals and alloys. (F23, F28, G4, EG-a)

SECTION G

SECONDARY MECHANICAL WORKING

1-G. Stretch-Forming: Final Properties Achieved in the Material; Tendency to Grain-Growth. G. B. Evans. *Aircraft Production,* v. 13, Nov. 1951, p. 332-334.

Results of experiments on Al alloys. Only in the case of material stretched and without further heat treatment can the final properties be estimated with reasonable assurance, assuming the material to be normal to start with. In all other cases grain growth may set in if control is not exercised. 11 ref. (G9, Al)

2-G. These Clips Iron Out Drawing Wrinkles. Jerry S. Adams. *American Machinist,* v. 95, Nov. 12, 1951, p. 137.

Wrinkle defects around the edges of products made by the Guerin process have been eliminated by use of clips. Used on either stretch or shrink flanges, the sandwich clips prevent cracks even on severe stretch jobs by controlling metal flow under the rubber mat. (G8)

3-G. Metallurgical Considerations in Machining. V. How Workpiece Structure Affects Tool Life. Milton C. Shaw and Prescott A. Smith. *American Machinist,* v. 95, Nov. 12, 1951, p. 138-141.

Behavior of carbon steels, alloy steels, austenitic materials, and cast irons.
(G17, M27, CN, AY, SS, CI)

4-G. Cutting Speeds May Double or Triple When Science Guides Machining. E. J. Tangerman. *American Machinist,* v. 95, Nov. 26, 1951, p. 144-147.

Cutting speeds, fluids, and temperatures. Tests on three common high-temperature alloys, Inconel X, Timken 16-25-6 and S-816. Bibliography on machinability and high-speed machining. 50 ref.
(G17, Ni, SG-h, AY)

5-G. Choose Your Metal-Cutting Fluids With Care. Leon Salz. *American Machinist,* v. 95, Nov. 12, 1951, p. 159-162.

What cutting fluids are and what they do. Money-saving tips. (G21)

6-G. Dynamometer for Torque and Thrust Due to Drilling. R. C. Brain and H. J. Hulf. *Engineering,* v. 172, Oct. 19, 1951, p. 487-488.

Drill dynamometer which was designed and constructed at the Sundbury research station of the Anglo-Iranian Oil Co., Ltd. is used for measuring torque and thrust loads exerted by twist drills, and has proved to be of considerable value in research into the behavior of cutting fluids during drilling operations. (G17)

7-G. Flame Cutting. Robert Sibley. *Iron Age,* v. 168, Nov. 15, 1951, p. 117-119.

Compounded hydrocarbon, combined with oxygen, cuts cleanly any armor plate thickness, leaving it ready for welding without further finishing. Speeds are average for flame cutting and a newly designed torch nozzle is the only special equipment required. Bevel edge angles as low as 20° are easily flame cut. (G22, ST)

8-G. Method of Machining Hard Metals Utilizes Electrical Energy. John S. Roller. *Machine and Tool Blue Book,* Dec. 1951, p. 127-128, 130, 132, 134, 136.

See abstract of "A New Method of Machining", *Iron and Steel Engineer,* item 378-G, 1951. (G17)

9-G. Shot Peening as a Factor in the Design of Gears. John C. Straub. *Machine and Tool Blue Book,* Dec. 1951, p. 163-166, 168, 170.

Effects on strength, and pitting and scoring resistance.
(G23, Q23, Q9, ST)

10-G. It's Easy to Bend. *Machine and Tool Blue Book,* Dec. 1951, p. 209-210, 212, 214-218, 220.

Increased knowledge of the cold bending of metals and recent improvements in bending machines.

Product design, material selection, types of bending machines, special devices for bending, bending of shapes, and loop and spiral bending. (G6)

11-G. Cold Headed Parts. Philip O'Keefe. *Materials & Methods,* v. 34, Nov. 1951, p. 85-100.

Bolts, screws, rivets, nails, nuts, electrical terminals, anti-friction bearing balls and rollers, and other small metal parts are mass produced by cold heading. Manufacturing, metallurgical, and cost factors which must be considered to specify cold heading or to design cold headed parts. Production methods and machines; headability of metals and alloys; design of cold headed parts; and competitive place of cold heading. (G10)

12-G. Sheet Stock: Ideas to Help Stretch It. *Modern Industry,* v. 22, Nov. 15, 1951, p. 39-47.

New machines, new ways to handle materials, to help conserve short supplies, and to cut costs. Applications to steel, Al, and Cu. (G1, ST, Al, Cu)

13-G. Bandsawing Light Metal Castings. *Modern Metals,* v. 7, Nov. 1951, p. 52.

Tabular data on production bandsawing of Al and Mg castings. (G17, Al, Mg)

14-G. Impact Extrusion of Magnesium. T. L. Patton. *Modern Metals,* v. 7, Nov. 1951, p. 54-57.

See abstract under similar title from *Iron Age,* item 329-G, 1951. (G5, Mg)

15-G. On the Improvement for the Machinabiilty of Cast Al Alloys. Fusao Hayama. *Reports of the Casting Research Laboratory,* No. 2, 1951, p. 20-24.

For improvement of the surface-finishing properties of cast Al alloys, Bi and Sn have a similar effect. The tensile strength of the Al alloy containing Sn is slightly lower, but yield point and extension are not changed. The effect of heat treatment is scarcely changed by addition of Sn, and surface finish of the heat-treated alloy is better than the alloy that is not heat treated. (G17, Q general, Al)

16-G. Designing Carbide Dies. M. L. Backstrom and E. J. K. Reitler. *Machinery* (London), v. 79, Nov. 8, 1951, p. 795-801.

Mechanical properties of the material in the dies. Application to blanking, piercing, forming, and drawing of various materials. (G general, T5, C-n)

17-G. Single Draw Produces Silicon-Copper Hemispheres. James A. Leake. *Iron Age,* v. 168, Nov. 29, 1951, p. 84-85.

Three dies in one stroke of a large hydraulic press perform three operations required to make finished hemispheres. Yield is thus one finished piece per stroke. Formerly, three draws, interstage annealing, restrike, trim and piece operations were required. After press operations, the draw parts are stress relieved. (G4, J1, Cu)

18-G. Use of Oxy-Acetylene in Pipe Fabrication. E. P. Auler. *Steel Processing,* v. 37, Nov. 1951, p. 555-559; *Industry & Welding,* v. 24, Dec. 1951, p. 34-36, 78-80.

Use as a convenient source of localized heat. Oxy-acetylene cutting torch, gouging torch, and flame of a heating torch. (G22, J2, ST)

19-G. Airframes Come to San Leandro. James Blane. *Western Machinery and Steel World,* v. 42, Nov. 1951, p. 78-81.

Miscellaneous fabrication equipment and procedures of Kaiser Mfg. Co. in production of parts for Lockheed's Neptune patrol bombers. Includes presswork, heat treatment, surface finishing, machining, and riveting. (G general, J general, K13, L general, T24)

20-G. Controlled Pressure Aids Deep Drawing. Wm. M. Stocker, Jr. editor. *American Machinist,* v. 95, Dec. 10, 1951, p. 138-142.

Advantages and disadvantages of two recently developed sheet-metal forming processes: Marforming and Hydroforming. (G1, G8)

21-G. Contour Turning. A Special American Machinist Report to the Metalworking Industries. Miles J. Rowan. *American Machinist,* v. 95, Dec. 10, 1951, p. 149-172.

An over-all picture of modern tracer-controlled turning. Basic tracing systems and how they operate. Limitations; job studies. (G17)

22-G. Surface Grinding of Titanium. Leo P. Tarasov and Gordon T. Rideout. *American Machinist,* v. 95, Dec. 10, 1951, p. 183, 185.

Beneficial effects of low wheel speed obtained with vitrified-bonded wheels on a small surface grinder. (G18, Ti)

23-G. Formability of Titanium Investigated. O. A. Wheelon. *Iron Age,* v. 168, Dec. 13, 1951, p. 140-143.

In general, Ti forms like Mg and machines like stainless steel. Most forming must be done hot. Studies included use of stretch forming, the Hydropress, power brakes, rolls, and planishing hammers. (G general, Ti)

24-G. Butt Brazing Carbide Tools Without Tip Pockets. David Kauffman. *Tool Engineer,* v. 27, Dec. 1951, p. 33-36.

Methods which may be used to eliminate the strains caused by butt brazing. (G8, T6, C-n)

25-G. Stainless Fabricating Methods Successfully Form Titanium Sheet. *Steel,* v. 129, Dec. 17, 1951, p. 94-95, 110.

How machines and procedures used to form intricate stainless structures can be adapted to shape Ti. In studies completed recently at Ryan Aeronautical Co.'s development laboratories, flat Ti sheet was formed to complex shapes. An experimental production procedure to determine the behavior of titanium when welded, formed, and heat treated. (G4, Ti)

26-G. Honed Edges Cure Carbide Ailments. Charles Frank. *Steel,* v. 129, Dec. 17, 1951, p. 106.

Some of the principal troubles encountered with carbide in the machining of ferrous metals. Suggestions on how to limit the difficulties. (G17, Fe, C-n)

27-G. Cutting Oils. A. E. Williams. *Mining Magazine,* v. 85, Nov. 1951, p. 279-282.

Properties and uses. Compares results of cutting with and without oil. (G21)

28-G. Precision and Eccentric Shapes Require Unusual Methods in Making Stainless Pipe. Fred M. Burt. *Western Metals,* v. 9, Nov. 1951, p. 42-43.

Equipment and procedures used by Standard Steel Corp., Los Angeles. Processes include resin coating, shearing, sawing, roll forming, Heliarc welding, and torch cutting. (G general, K1, L26, SS)

29-G. Putting the Squeeze on Steel. Richard Cheney. *Steelways,* v. 7, Nov. 1951, p. 18-20.

A cold-forming process developed in Germany during World War II. Giant presses are used. (G1, ST)

30-G. Method X. Frances M. Campbell. *Steelways,* v. 7, Nov. 1951, p. 28-29.

A metal-shaping process that tackles the hardest of alloys. When a spark jumps between a brass electrode and a piece of tungsten carbide or other hard metal, a hole is made in the latter. (G17, C-n)

31-G. Grinding Methods Evolved for Titanium. *Journal of Metals,* v. 3, Dec. 1951, p. 1128-1129.

Results, showing the unexpected beneficial effects of low wheel speed, were obtained solely with vitrified bonded wheels on a small surface grinder. It is possible that similar results will be obtained with vitrified bonded wheels in other precision operations such as cylindrical or internal grinding, but experiments have not yet verified this assumption. (G18, Ti)

32-G. Magnet Yokes Made Rapidly on High Precision Basis. Herbert Chase. *Magazine of Tooling and Production,* v. 17, Dec. 1951, p. 49-51, 55, 72, 76.

Setups which perform blanking, deburring, tapping, forming, projection welding, and broaching operations on large quantities yet hold the close dimensions essential for a quality product. (G1, G17, K3)

33-G. Directional Variation of Grinding Hardness in Silicon Carbide (SiC). J. A. Kohn. *Industrial Diamond Review,* new ser., v. 11, Oct. 1951, p. 211-212; Nov. 1951, p. 235-237.

Data were obtained with standard diamond-grinding equipment, using SiC as the abrasive. Results indicate that cleavage plays an important role. (G18, C-n)

34-G. Powder Washing for Metal Removal. R. S. Babcock. *Canadian Metals,* v. 14, Nov. 1951, p. 22-27.

New tool for removal of excess and defective material from steel castings. The method uses powder and oxygen-gouging equipment for washing out sand inclusions, scabs or penetrations, and burned core sand. (G22, CI)

35-G. Methods of Shaping Cemented Carbides. *Machinery* (London), v. 79, Nov. 22, 1951, p. 882.

(G general, C-n)

36-G. Heavy Hydraulic Presses. *Engineer,* v. 192, Nov. 23, 1951, p. 670.

Special equipment for the preparation of plates for use in heavy welding fabrications. Includes 750-ton hydraulic flanging and joggling press and 3600-ton hydraulic vertical plate bending machine. (G6, ST)

37-G. Economic Effects of Cemented Carbide Alloys Upon Machining and Chipless Forming. (In German.) Julius Holzberger. *Stahl und Eisen,* v. 71, Oct. 11, 1951, p. 1098-1102.

Recent developments, including review of the literature. 11 ref. (G17, T5, C-n)

38-G. A New Heavy-Duty Light-Metal Machining Alloy as an Example of the Application of Experiences With Bearings to the Machining Process. (In German.) A. Röhenbeck. *Metall,* v. 5, Nov. 1951, p. 486-489.

Theoretical basis and experimental development of Al alloys fulfilling the four prerequisites of machining alloys. The cutting edge is lubricated by liquid metal (lead). Experiments with "Ledloy" confirm the conclusions presented. 10 ref. (G17, Al)

39-G. (Book) **Machining of Stainless Steel.** 27 pages. Metal Cutting Tool Institute, 405 Lexington Ave., New York 17, N. Y. $1.00.

Composition and general characteristics of wrought stainless steels, practical considerations in machining, tool design, and lubricants. (G17, SS)

40-G. (Book) **Machining Alcoa Aluminum.** 68 pages. 1951. Aluminum Co. of America, Gulf Bldg., Pittsburgh 19, Pa.

Specific, desirable characteristics in tools for machining aluminum and its alloys; speeds, feeds, and depths of cuts which will operate these tools satisfactorily; where common practice as well as tools of standard design may be used; and where the use of special practices or tools will produce better results. (G17, Al)

41-G. (Book) **Forming Alcoa Aluminum.** 77 pages. 1951. Aluminum Co. of America, Gulf Bldg., Pittsburgh 19, Pa.

Recommended procedures for blanking and piercing, drawing, embossing, coining, stamping, spinning, tube and shape bending, and other mechanical forming methods. (G general, Al)

42-G. (Book) **The Grinding Wheel.** Kenneth B. Lewis, 405 pages. 1951. The Grinding Wheel Institute, Greendale, Mass.

A textbook of modern grinding practice by a consulting engineer, well known especially in the wire industry. While it exhaustively treats such subjects as abrasive materials, shapes and wheels, machines for cylindrical, centerless, gear, and other types of grinding, it also has adequate chapters on evaluation of surface quality, "superfinish", and design considerations. E.E.T. (G18)

43-G. Solving Titanium Machining Problems. *Machinery* (American), v. 58, Dec. 1951, p. 160-166.

A comparison of the mechanical and physical properties of Ti with those of steel and other high-temperature alloys. Various cutting operations are analyzed. Results of various machinability tests. (G17, Q general, P general, Ti, SG-h)

44-G. Cutting Speeds and Feeds for Slotting With End-Mills. Robert Corey Deale. *Machinery* (American), v. 58, Dec. 1951, p. 167-170.

Tables give the cutting speeds and feeds to be used under various conditions on hot rolled steels and cast iron. (G17, ST, CI)

45-G. Powder Cutting of Metals. Allen S. Park. *Compressed Air Magazine,* v. 56, Dec. 1951, p. 328-331.

Technique employs powdered iron in the oxygen flame thus enabling stainless steel and other hard-to-cut materials to be readily cut. (G22, SS)

46-G. The Theory of Plasticity Applied to a Problem of Machining. E. H. Lee and B. W. Shaffer. *Journal of Applied Mechanics,* v. 18, (*Transactions of the American Society of Mechanical Engineers,* v. 73), Dec. 1951, p. 405-413.

Recently developed methods of analyzing stress and strain distributions in the plane plastic flow of an ideally plastic material are applied to the problem of machining. Results of this theory are compared with published experimental results, and with other theoretical analyses. 20 ref. (G17, Q23)

47-G. Fundamental Aspects of Metal Cutting and Cutting Fluid Action. Hans Ernst. *Annals of the New York Academy of Science,* v. 53, art. 4, June 27, 1951, p. 936-961.

Results of experimental investigations and mathematical analyses. 36 ref. (G21, G17)

48-G. The Metal Cutting Process as a Means of Studying the Properties of Extreme Pressure Lubricants. Milton C. Shaw. *Annals of the New York Academy of Science,* v. 53, art. 4, June 27, 1951, p. 962-978.

The inter-relationship between the shearing and sliding phases of cutting; sliding and frictional aspects of the process. (G21, G17, Q9)

49-G. Superfine Grinding. G. Cattin. *Aircraft Production,* v. 13, Dec. 1951, p. 384-386.

The factors involved in obtaining mirror finishes and superfinishes on metal surfaces. Machines used for these operations. (G18)

50-G. Stretch-Forming. G. W. Weeks. *Aircraft Production,* v. 13, Dec. 1951, p. 393-395.

Results of an investigation on Al alloy sheet. The orange-peel effect was overcome by employing a subcritical annealing treatment. Mechanical properties of the panel after various stages of annealing are tabulated. (G9, J23, Al)

51-G. Nerve and Sharp Tools Machine *Any* Stainless at High Speeds. E. Von Hambach. *American Machinist,* v. 9, Jan. 7, 1952, p. 117-120.

Proper grinding and fine surface finish on cutting edges of tools, coolant in the right place and under plenty of pressure, rigid and husky machine tools, and lots of nerve are the requirements for greatly increasing machining speeds. (G17, SS)

52-G. How Ryan Hot Forms Titanium. *American Machinist,* v. 96, Jan. 7, 1952, p. 125.
The part is heated to medium red heat and deformed almost to completion. It is then reheated and deformation completed. No springback occurs. (G4, Ti)

53-G. Radioactive Tracers Speed Tool Life Study. E. J. Tangerman. *American Machinist,* v. 95, Dec. 24, 1951, p. 100-101. (Based on paper by M. E. Merchant and E. J. Krabacher.)
Previously abstracted from *Journal of Applied Physics.* See item 297-G, 1951. (G17, SG-h)

54-G. Plane Makers Cut Costs, Materials With Plastic Dies. *Business Week,* Jan. 5, 1952, p. 58-60, 62.
The many advantages of plastic over Zn dies for forming aircraft sheet metals. (G1)

55-G. The Grinding of Steel. *Edgar Allen News,* v. 30, Oct. 1951, p. 973-976; Nov. 1951, p. 1008-1009; Dec. 1951, p. 9-10.
A discussion on various abrasives. Factors such as influence of mechanical properties of steel, use of coolants, types of grinding equipment, and wheel design and maintenance. (To be continued.) (G18, ST)

56-G. Vapour Blast Liquid Honing. Donald Grant. *Electroplating and Metal Finishing,* v. 4, Dec. 1951, p. 377-378, 384.
A brief recapitulation of the process. Applications. (G19)

57-G. The Effect of Mill Tolerances on the Finished Sheet Metal Stamping. Stanley R. Cope. *Finish,* v. 9, Jan. 1952, p. 21-25, 82-83.
How careful planning can hold inaccuracies to a minimum. Relation between tolerances and practical die design and tooling cost. Detailed diagrams. (G3)

58-G. Electronic Tracing Head Increases Precision Flame Cutting Volume up to 25%. *Industry & Welding,* v. 24, Jan. 1951, p. 60, 62.
How production flame cutting with an electronic tracing head that produces work to extremely close tolerances has proved to be profitable for a job welding shop. (G22)

59-G. Heating With the Acetylene Flame. *Linde Tips and Oxy-Acetylene Tips,* v. 31, Jan. 1952, p. 5-9.
How bending, straightening, and forming operations can be done with the oxy-acetylene flame. Numerous diagrams and illustrations. (G general)

60-G. Die Life and Die Typing; German Hobbing Techniques. H. A. Wallace. *Metal Treatment and Drop Forging,* v. 18, Dec. 1951, p. 559-563, disc., p. 563-564.
Method of increasing die life and decreasing cost. Forging operations, manufacture of the hob, and effect of scale. Schematic diagrams. (G16, F22, TS, CN)

61-G. Toy Production; Bigtime Operation on a Miniature Scale. *Steel,* v. 129, Dec. 24, 1951, p. 54-57.
The mass-fabricating metalworking techniques used to produce toys from 16, 18, 20, 22, and 24-gage prime steel. Progressive dies and power presses. Cleaning and finishing operations. (G1, L general, T10, CN)

62-G. Eliminate Grinding Damage —Reduce Tool Failure. H. Pottle. *Steel,* v. 129, Dec. 31, 1951, p. 56-57.
Too much heat between grinding wheel and work can cause cracking and skin softening, two principal reasons for tool failure. By feeding coolant directly through the grinding wheel, actual cutting temperature can be lowered by as much as 600°. (G18, TS)

63-G. Use of Abrasives in Modern Fabrication. *Welding and Metal Fabrication,* v. 19, Dec. 1951, p. 457-462.
Factors concerning the composition and manufacture of grinding wheels. General recommendations on their use. (G18)

64-G. Powder Washing for Metal Removal. R. S. Babcock. *Welding Journal,* v. 30, Dec. 1951, p. 1092-1097.
Previously abstracted from *Canadian Metals.* See item 34-G, 1952. (G22, CI)

65-G. New Process for Producing Holes in Hard Materials. A. Kuris. *Machinery* (London), v. 79, Dec. 6, 1951, p. 991-992.
See abstract from *Machinery* (American) item 202-G, 1951. (G17)

66-G. Discussion of Cutting With Low Pressure Oxygen. (In Russian.) S. V. Begun and S. G. Guzov. *Avtogennoe Delo,* v. 22, Apr. 1951, p. 28-29.
Above authors discuss separately two papers appearing in *Avtogennoe Delo,* v. 21, May and June, 1950. See items 281-G and 291-G, 1950. (G22, ST)

67-G. Rockets for Bazookas. Joseph Geschelin. *Automotive Industries,* v. 106, Jan. 1, 1952, p. 34-35, 86.
Production procedures. Motor body is made from steel tubing 2.079-2.089 in. o.d. and wall thickness of 0.247 in. Machine-shop operations, heat treating, degreasing, and spray painting of component parts. (G17, J general, L12, L26, ST)

68-G. Plastic Tooling Cuts Costs at Lockheed. *Aviation Week,* v. 56, Jan. 7, 1952, p. 42-44, 47-48.

Use of plastic tooling for forming, trimming, and drilling of Al alloy aircraft parts. Advantages. (G general, Al)

69-G. Stampings Make Strong, Accurate Camera Parts. Herbert Chase. *Iron Age*, v. 168, Jan. 10, 1952, p. 92-94.

Stamping problems encountered in production of Ansco cameras. Dies and stamping procedure. (G3)

70-G. Bending Roll Design Analysis. E. A. Randich. *Product Engineering*, v. 23, Jan. 1952, p. 133-135.

Method for calculating data needed for the detail design of pyramid-type bending rolls. Forces acting on rolls are analyzed and equations derived for diameters of top and bottom rolls to curve plate of different widths and thicknesses. (G6)

71-G. Disintegration Becomes Production Necessity. Gene Burch. *Steel*, v. 130, Jan. 14, 1952, p. 60-62.

The ability of disintegration equipment to drill or cut hardened metal has resulted in the salvaging of millions of dollars worth of parts that would have been junked if they could not be repaired or salvaged. Developments in the field and various applications. (G17, A8)

72-G. Jet Stream Lowers Cutting Tool Temperatures. *Steel*, v. 130, Jan. 21, 1952, p. 70.

High-speed jets of oil directed from below single-point cutting tools and using a specially prepared cutting oil promise a sizable increase in either tool life or cutting speed. (G21)

73-G. Some Outstanding European Die-Making Techniques. Federico Strasser. *Steel Processing*, v. 37, Dec. 1951, p. 614-616, 637.

Differences between American and European cutting-die design and die-building technique; features which are unusual to most American toolmakers. (G16)

74-G. Carbide Tools for Job Lot Production. Russell McLaughlin. *Tool Engineer*, v. 28, Jan. 1952, p. 52-53.

Presents a cost analysis chart to determine the economic advantages of carbide tool application. (G17, C-n)

75-G. Cutting Fluids; Selection and Application. Robert T. Kimmel. *Tool Engineer*, v. 28, Jan. 1952, p. 61-66.

Types of fluids and their chemical compounds, storage and handling, and metal-cutting fluid recommendations. (G21)

76-G. Cold-Forming Steel Sections. R. Saxton. *Metallurgia*, v. 44, Dec. 1951, p. 285-286.

Some of the factors concerned in the production of steel sections of small cross-sectional area. Brief reference is made to the hot drawing process. (G4, ST)

77-G. Overcoming "Orange Peeling" on Stretch-Pressed Aluminium Alloy Aircraft Skinning. G. W. Weeks. *Metallurgia*, v. 44, Dec. 1951, p. 287-289.

See abstract of "Stretch-Forming" *Aircraft Production*, item 50-G, 1952. (G9, J23, Al)

78-G. The Machinability of Alloy Steels in Connection With Fine-Finish Turning. (In German.) Gustav Wagner and Paul Wiest. *Stahl und Eisen*, v. 71, Nov. 22, 1951, p. 1317-1323.

Rapid methods for machinability testing. Results of examination of 23 alloy steels by these methods. Relative merits of the different methods. Data are charted and tabulated. (G17, AY)

79-G. (Book) General Engineering Workshop Practice. Ed. 2, 5 pages. 1951. Odhams Press, Ltd., Long Acre Lane, London W.C.2, England. 12s., 6d.

Ranges from bench work and machine-shop equipment to modern methods of inspection. Machining processes include turning, milling, and gear cutting. Presswork, stamping, die casting, heat treatment, welding, forging, and brazing are also covered. Numerous tables. (G general, E13, J general, K general, F22)

80-G. (Book). Rezhimy Rezaniia Metallov Instrumentami iz Bystrorezhushchei Stali (dlia Odnoinstrumentnoi Obrabotki) [Conditions for Cutting Metals With High Speed Toolsteels (for Single-Point Machining.)] 339 pages. 1950. State Scientific-Technical Publishing House for Machine-Construction Literature, Moscow, U.S.S.R.

Standardizes conditions for machining ferrous and nonferrous metals and light alloys on lathes, planing machines, grooving machines, milling machines, drilling machines, screw-cutting lathes, gear-cutting machines, and broaching machines. Extensive tabular data and schematic diagrams. 66 ref. (G17)

81-G. Titanium; Design and Manufacturing Technique. O. A. Wheelon. *Aircraft Production*, v. 14, Jan. 1952, p. 21-28.

See abstract of "Formability of Titanium Investigated" in *Iron Age*; item 23-G, 1952. (G general, Ti)

82-G. Fuel Tanks Formed With Hydraulic Pressure. E. A. Schrodeck. *Automotive Industries*, v. 106, Jan. 15, 1952, p. 33, 108.

Final sizing of aircraft fuel tank after welding is done by placing heat treated tank inside large sizing die made in halves and bolted together, and pumping in hydraulic fluid. The tank is stretch-formed to a 6% elongation. (G9, Al)

83-G. Tank Hull Output Upped by New Techniques. Thomas Mac New.

Automotive Industries, v. 106, Jan. 15, 1952, p. 38-42, 112.

Processes for welding, drilling, machining, milling, and inspection of tank hulls at Eddystone plant of Baldwin-Lima-Hamilton Corp. (G17, K general, S general, ST)

84-G. Jet Sprayed Oil Ups Tool Life 1200 Pct. *Iron Age,* v. 169, Jan. 17, 1952, p. 97-99.

See abstract of "Jet Stream Lowers Cutting Tool Temperatures" in *Steel;* item 72-G, 1952. (G21)

85-G. How to Double a Tool's Output. *Business Week,* Jan. 19, 1952, p. 74, 76, 78, 80.

See abstract of "Jet Stream Lowers Cutting Tool Temperatures" in *Steel;* item 72-G, 1952. (G21)

86-G. Little High-Pressure Jets From Below Cool Cutting Edges Better. R. J. S. Pigott. *American Machinist,* v. 96, Jan. 21, 1952, p. 281-286.

See abstract of "Jet Stream Lowers Cutting Tool Temperatures" in *Steel;* item 72-G, 1952. (G21)

87-G. New Metal Cutting Concept Lengthens Tool Life. *Steel,* v. 130, Jan. 21, 1952, p. 76.

Process developed by K. R. Blake, Metalloid Corp., Huntington, Ind., uses a chemical compound known as Metalloid X-20, which acts to limit the movement of the atoms in the crystal lattice of the metal when it is being cut. Tool life has been increased up to 900% and speeds and feeds 25-35%. (G17)

88-G. Oil Jet Increases Cutting Tool Life. *Iron and Steel Engineer,* v. 29, Jan. 1952, p. 146-148.

See abstract of "Jet Stream Lowers Cutting Tool Temperatures" in *Steel;* item 72-G, 1952. (G21)

89-G. Integrally Stiffened Wing Panels Formed by Shot Peening Method. Ted C. Simmons. *Western Metals,* v. 10, Jan. 1952, p. 25-27.

Equipment and procedures. 75S-T6 Al plate is the material used. (G23, Al)

90-G. Shot Peening Deserves Consideration During Initial Design. *SAE Journal,* v. 60, Jan. 1952, p. 41-46. (Based on "Ordnance Applications of Shot Peening", by Earl H. Abbe; "Shot Peening of Heavy-Duty Transmission Gearing", by Thomas Backus; and "Shot Peening in the Design of Machine Parts", by John C. Straub.)

Designing new machine parts from the start to be shot peened may result in better products in many cases and reduce production expense in other cases. Where ordinary cast iron is impractical, the possibility of using shot-peened nodular iron is reviewed. (G23, CI)

91-G. Exhaust Ventilation for Machine Tools Used on Materials of High Toxicity. H. F. Schulte, E. C. Hyatt, and F. S. Smith, Jr. *A.M.A. Archives of Industrial Hygiene and Occupational Medicine,* v. 5, Jan. 1952, p. 21-29.

Factors to be considered in design of machines. Data on U, Th, Be, Tl, and Pb. (G17, A7, U, Th, Be, Tl, Pb)

92-G. Cold Pressing of Steel. J. Lomas. *British Steelmaker,* v. 13, Jan. 1952, p. 28-33.

The general characteristics of mechanical and hydraulic presses and also the types of steel which are suitable for cold pressing, the metallurgy of the process, and the various treatments required to insure a satisfactory product. (G1, ST)

93-G. The Working of Aluminium in the Shipyard. *Aluminium Development Association* (London), Information Bulletin 18. Nov. 1951, 36 pages.

Machining, methods of joining, protective coatings, and general notes on storage. Recommended alloys are listed. (G17, K general, L general, Al)

94-G. Plastic Deformation During the Cutting of Steel. (In Russian.) V. V. Kuziushin. *Stanki i Instrument,* v. 22, Apr. 1951, p. 19-21.

From theoretical considerations and experimental data, a coefficient of information was developed which is used in computing the deformation of metal during cutting. Results are charted. (G17, ST)

95-G. Study of Filing. III. (In Japanese.) Hidehiko Takeyama. *Journal of Mechaincal Laboratory,* v. 5, July 1951, p. 89-91.

Structure and roughness of filed surfaces, adherence of metal to the file edges, and influence of oil on the process. Graphs and micrographs. (G17)

96-G. An Experiment in Superfinishing. (In Japanese.) Renzo Kaneko and Kunio Yamada. *Journal of Mechanical Laboratory,* v. 5, Aug. 1951, p. 165-168.

An investigation of superfinishing of cast iron. Apparatus is diagrammed, surface structures illustrated, and data tabulated. (G19, CI)

97-G. Superfinishing of the Lace Surface of Ball Bearings. (In Japanese.) Renzo Kaneko, Kunio Yamada, and Yoshihiko Watanabe. *Journal of Mechanical Laboratory,* v. 5, Sept. 1951, p. 183-187

Apparatus and procedure. Includes graphs. (G19, ST)

98-G. Study on Ball Bearing Materials. (In Japanese.) Etsuo Hayashi and Shigemitsu Demachi. *Journal of Mechanical Laboratory,* v. 5, Sept. 1951, p. 188-191.

Graphs and photomicrographs show results of wear on surface structure. Conclusions concerning effects of various fabrication variables are summarized in English abstract. (G general, Q9, ST)

99-G. Tungsten-Carbide Tooling. Part I. Factors in the Design and Operation of Multiple-Edge Tools With Particular Reference to Milling Cutters. Part II. Tip-Forms Associated With the Design of Brazed and Inserted Teeth; Methods of Retaining Inserts. *Aircraft Production,* v. 14, Jan. 1952, p. 30-35; Feb. 1952, p. 68-72. (G17, T6, C-n)

100-G. Pipe Fabrication With Oxy-Acetylene. E. P. Auler. *Canadian Metals,* v. 15, Jan. 1952, p. 40, 42, 44.

Various applications in cutting, gouging and heating. (G22, J2)

101-G. Gouging and Cutting Torch Uses Electric Arc and Compressed Air. Hubert Chappie. *Foundry,* v. 80, Feb. 1952, p. 189-190.

Arcair process which is a means of removing metal, through utilization of a torch requiring a ⅜ x 12-in. carbon electrode, an ordinary 300-400-amp. d.c. welding machine, and a compressed-air supply. (G22)

102-G. The Arcair Torch. *Canadian Metals,* v. 15, Jan. 1952, p. 26-27.

See abstract of "Gouging and Cutting Torch Uses Electric Arc and Compressed Air", Hubert Chappie, *Foundry;* item 101-G, 1952. (G22)

103-G. Cold Header Produces Commutator Segments. Herbert Chase. *Iron Age,* v. 169, Jan. 24, 1952, p. 70-71.

Production of Cu parts for d.c. motors and generators by cold heading machines and trimmers that operate automatically Special machines separate good parts from scrap. (G10, Cu)

104-G. Bolster Plate Threads Quickly Repaired With Wire Inserts. *Iron Age,* v. 169, Feb. 7, 1952, p. 145.

Press down-time for repair of bolster plate threads has been substantially reduced through use of helical wire thread inserts at Stewart-Warner Corp., Chicago. Stainless steel Heli-Coil thread inserts are formed from wire with a diamond-shaped cross-section. The wire-insert method produces a permanently repaired thread. (G1, SS)

105-G. Radioactive Tracers for Rapid Measurement of Cutting Tool Life. M. Eugene Merchant and E. J. Krabacher. *Journal of Applied Physics,* v. 22, Dec. 1951, p. 1507-1508.

The method consists, in essence, of machining with a cutting tool which has been rendered radioactive by neutron irradiation in a nuclear reactor and measuring the radioactivity of the collected particles worn from the tool during a few seconds of cutting. (G17, S19, C-n)

106-G. New Cooling Oil and Lubricating Process to Increase Tool Life 300-1200%. *Machine and Tool Blue Book,* v. 48, Feb. 1952, p. 137-140, 142, 144.

See abstract of "Jet Stream Lowers Cutting Tool Temperatures", *Steel,* item 72-G, 1952. (G21)

107-G. Advances in Machining and Cutting Operations. Taylor White. *Metal Progress,* v. 61, Jan. 1952, p. 84-86.

Variables are grouped under four headings—material, dies, equipment, and management. Improvement in machinability. (G17)

108-G. Magnethermic Induction Billet Heaters. *Modern Metals,* v. 7, Jan. 1952, p. 36-37.

Billet heaters for use in connection with the hot-extrusion of light metals. (G21, Al, Mg)

109-G. Ultra-High Pressure Lubrication. *Screw Machine Engineering,* v. 13, Feb. 1952, p. 51-53.

See abstract of "Jet Stream Lowers Cutting Tool Temperatures", *Steel,* item 72-G, 1952. (G21)

110-G. Cool Grinding Prevents Tool Failure. H. Pottle. *Screw Machine Engineering,* v. 13, Feb. 1952, p. 55-56.

The damages which occur when tools are improperly ground. In a new technique to keep the work cool developed by Do All Co., the coolant is forced directly through the wheel, from inside out. (G21)

111-G. Stampings Formed Faster. Herbert Chase. *Steel,* v. 130, Feb. 4, 1952, p. 90-91.

Unusual stampings produced by Leake, Monroe, Mich. Roof panels, 17 sq. ft. in area, are drawn from 0.070-in. steel and later glass-surfaced on both sides. A tractor part sheared from ¾-in. square steel bar costs less. (G4, ST)

112-G. Revolutionary Metal Cutting Development Announced. *Steel Processing,* v. 38, Jan. 1952, p. 27-28.

See abstract of "Jet Stream Lowers Cutting Tool Temperatures", *Steel;* item 72-G, 1952. (G21)

113-G. Milling Product Analysis and Equipment Selection. Earl P. Leeds. *Tool Engineer,* v. 28, Feb. 1952, p. 37-40.

Improved milling through proper selection of equipment and ingenuity of application. (G17, ST)

114-G. Current Research on Improving the Economy of the Oxygen-Cutting Process. (In French.) M. Renaudie. *Soudure et Techniques Connexes,* v. 5, Nov.-Dec. 1951, p. 263-266.

Oxygen-cutting of very thick plates and processes which result in a large reduction of the consumption of gases were investigated. Includes graphs. (G22)

115-G. Causes and Elimination of Deep Drawing Defects With Consid-

eration of the Deep Drawing Testing Process. (In German.) Gerhard Oehler. *Berichte der Deutschen Keramischen Gesellschaft e.V. und des Vereins Deutscher Emailfachleute e.V.*, v. 28, Oct. 1951, p. 576-577.

Discusses briefly facts presented in two tables with illustrations on the deep drawing of steel plates. (G4, ST)

116-G. Compressed Air; Carbon Arc Speed Metal Cutting. *Iron Age*, v. 169, Feb. 14, 1952, p. 134-135.

Process uses the Arcair torch which requires a ⅜ x 12 in. carbon electrode, an ordinary 300-400 amp. d.c. welding machine and compressed air. Development work was done by National Supply Co. (G22)

117-G. Automotive Drawing Compounds—Specifications and Applications. J. T. O'Reilly. *Lubrication Engineering*, v. 8, Feb. 1952, p. 14-17.

Emphasizes the practice of lubrication in press forming operations on low-carbon steels. (G21, CN)

118-G. Revolutionary Method of Cooling and Lubricating Cutting Tools. *Machinery* (American), v. 58, Feb. 1952, p. 166-169.

See abstract of "Jet Stream Lowers Cutting Tool Temperatures", *Steel*, Item 72-G, 1952. (G21)

119-G. Design and Application of Tungsten Carbide Blanking and Piercing Tools. K. L. Pickett. *Machinery* (London), v. 80, Jan. 24, 1952, p. 165-167.

Methods of working the material and pitfalls to be avoided. (G17)

120-G. Machining Titanium Alloys. *Magazine of Tooling and Production*, v. 17, Feb. 1952, p. 80, 112-113, 116-118. (Reproduced from "Air Force Curtiss-Wright Machinability Report," v. 2, Sec. 5.)

The present status of Ti. Machining characteristics and mechanical properties. (G17, Q general, Ti)

121-G. A Particular Problem in the Re-Design and Development of a Pressed-Metal Assembly. J. A. Grainger. *Sheet Metal Industries*, v. 28, Nov. 1951, p. 1009-1013; Dec. 1951, p. 1107-1112.

As applied to an automotive air-filter assembly. (To be continued.) (G4)

122-G. Powder Processes, A New Industrial Tool. A. B. Kinzel, D. Swan, H. Biers, and H. R. Pufahl. *Transactions of the Institute of Welding*, v. 14, Oct. 1951, p. 154-159.

See abstract from *Canadian Metals;* item 375-G, 1951. (G22, EG-a, CI)

123-G. Possibilities of the Pre-Stressing of Metallic Constructions. W. Soete. *Transactions of the Institute of Welding*, v. 14, Oct. 1951, p. 161-167; disc., p. 167-168.

What happens in systems in equilibrium under external forces and in systems in internal equilibrium. Data are graphed. (G23, ST)

124-G. Europe Studies Carbide Cutting. E. J. Tangerman. *American Machinist*, v. 96, Feb. 1952, p. 134-135.

Some of the latest answers on carbide cutting, in pictures, from the research of J. A. Pekelharing, head of research for N. V. Philips Gloeilampenfabriken, Eindhoven, Holland; and E. M. Trent of Hard Metal Tools, Ltd., Coventry, England. (G17, C-n)

125-G. How to Run a Drillpress. H. E. Linsley. *American Machinist*, v. 96, Feb. 1952, p. 147-162.

The principles of drilling; the various types of drill presses and how to care for them; the proper feeds and speeds for different classes of material; what coolants to use, and when; how to grind drills; how to hold the work; and how to perform operations other than straight drilling. Graphs, and tabulated data. (G17, ST, SS, CN)

126-G. How To Get the Most Out of Bandsaw Blades. H. J. Chamberland. *American Machinist*, v. 96, Feb. 1952, p. 164-165.

Results of tests using SAE 1020 steel. Cutting rate and time, volume of metal removed, and saw width, set, and gage before and after test. Mechanical properties, transformations, and microstructure of the steel. (G17, CN)

127-G. Tests of a New Technique for Metal-Cutting Lubrication Show You Can Get 3 to 12 Times as Much Life From Cutting Tools. *Factory Management and Maintenance*, v. 110, Feb. 1952, p. 120-123.

See abstract of "Jet Stream Lowers Cutting Tool Temperatures", *Steel;* item 72-G, 1952. (G21)

128-G. The Effect of Speed and Feed on the Mechanics of Metal Cutting. B. T. Chao and G. H. Bisacre. *Institution of Mechanical Engineers, Proceedings.* (Industrial Administration and Engineering Production), v. 165, W.E.P. 63, 1951, p. 1-9; disc. 10-13.

With respect to cutting speed or feed of a metalcutting tool, changes in the geometry of the chip, tool forces, tool build-up, and surface finish occur. A logical theory to explain these variations in the mechanics of the process is attempted. The problem of tool wear is not included. A series of tests was conducted on mild steel and Cu, over a wide range of speed, feed, and tool angle. (G17, CN, Cu, TS)

129-G. The Fundamental Geometry of Cutting Tools. G. V. Stabler. *Institution of Mechanical Engineers, Proceedings,* (Industrial Administration and Engineering Production), v. 165, W.E.P. 63, 1951, p. 14-21; disc. 21-26.

A full geometrical analysis of a cutting-tool edge is made. The fundamental angles are related to traditional workshop terms, and may readily be applied to any cutting tool. A law of chip flow is given and its effects on the resulting chip shape are analyzed. The effect of unit cube passing through the shear plane is also analyzed and a method is given for finding the direction cosines of the axes of the ellipsoid of stress. The flow law is used to find the directions of the cutting force between chip and tool and its various components. Although predominantly theoretical, the paper has a practical background. (G17)

130-G. Design and Application of Tungsten Carbide to Blanking and Piercing Press Tools. K. L. Pickett. *Sheet Metal Industries,* v. 29, Feb. 1952, p. 129-143.

See abstract from *Machinery* (London), item 119-G, 1952. (G17, C-n)

131-G. Heavy Scrap Cutting in the Steel Mill. L. P. Elly. *Welding Journal,* v. 31, Feb. 1952, p. 97-101.

How application of oxy-fuel gas cutting increases the volume of heavy melting scrap delivered to the openhearths and lowers the cost of scrap preparation. (G22, ST)

132-G. Cutting and Flame Processing. R. S. Babcock. *Blast Furnace and Steel Plant,* v. 40, Feb. 1952, p. 215-219.

Various flame-cutting applications to heavy equipment, scrap, slabs, ingots, etc. (G22, Fe, ST)

133-G. Revolutionary Metal Cutting Development Announced. *Blast Furnace and Steel Plant,* v. 40, Feb. 1952, p. 228.

See abstract of "Jet Stream Lowers Cutting Tool Temperatures", *Steel;* item 72-G, 1952. (G21)

134-G. Fabricated Culvert Pipe for Labrador. *Canadian Metals,* v. 15, Feb. 1952, p. 44-45.

Application of corrugated metal plate for drainage culverts. Traveling shop incorporating punch-riveter and forming roll makes the pipe from sheet steel near the point of use. (G11, K13, T4, CN)

135-G. Fabricating Aluminum Washing Machine Tubs. *Canadian Metals,* v. 15, Feb. 1952, p. 46.

Press operations in drawing the tubs. (G4, Al)

136-G. Machinability of Metals. Francis W. Boulger. *Canadian Metals,* v. 15, Feb. 1952, p. 52.

Various theories resulting from scientific research on properties important in machining. (G17)

137-G. Titanium Fabrication Progress. James Joseph. *Light Metal Age,* Feb. 1952, p. 10-11, 30.

Production machining, hot forming, work hardening, and tapping difficulties. (G17, G general, Ti)

138-G. New Basic Concept of Metal Removal Increases Tool Life Several Hundred Per Cent. *Machine and Tool Blue Book,* v. 48, March 1952, p. 225-226, 228-229.

See abstract of "New Metal Cutting Concept Lengthens Tool Life", *Steel,* item 87-G, 1952. (G17)

139-G. New Cutting Fluid Eliminates Rust, Gum, Stink. William F. Schleicher. *Machine and Tool Blue Book,* v. 48, March 1952, p. 251-254, 256.

Product referred to as "Trim" is the result of several years' intensive research which delved deeply into the causes of gumming and other objectionable features of cutting fluids. With this coolant, it is said to be necessary to change tools only once in every four to six weeks. (G21)

140-G. Design and Application of Tungsten Carbide Blanking and Piercing Tools. K. L. Pickett. *Machinery* (London), v. 80, Jan. 31, 1952, p. 209-213. (A condensation.)

Continues a discussion on various points to be observed in designing cemented carbide press tools. (G2, T6, C-n)

141-G. Forming Titanium Parts for Aircraft. O. A. Wheelon. *Machinery* (London), v. 80, Feb. 7, 1952, p. 223-228.

Tests made to determine fabrication characteristics for design and manufacturing guidance. Production operations. (G general, T24, Ti)

142-G. Improvements in Quality of Deep Drawing Sheet Steel. T. F. Olt and R. S. Burns. *Metal Progress,* v. 62, Feb. 1952, p. 51-56.

Changes in manufacturing methods. Variation in properties in drawn steel and its causes. Other means of securing a greater degree of uniformity in mechanical properties and drawing behavior. Future trends. (G4, Q general, CN)

143-G. Titanium; Cutting Its Alloys With Band Tools. H. J. Chamberland. *Western Machinery and Steel World,* v. 43, Feb. 1952, p. 80-81.

Some of the factors to be considered. (G17, Ti)

144-G. Forming Titanium. *Aircraft Production,* v. 14, Mar. 1952, p. 74-75.

Results of experiments by Ryan Aeronautical Co., San Diego, Calif. to determine the behavior of Ti when welded, formed, and heat treated. Most stainless steel forming techniques can be adapted to the fabrication of Ti parts. Data are tabulated.
(G general, K general, J general, Ti)

145-G. Stretch-Forming. Part 1. Construction and Operation of the Sheridan Longitudinal Machine; Forming Technique. Richard Wood. *Aircraft Production,* v. 14, Mar. 1952, p. 77-84.
An extensive description. (G9)

146-G. CO_2 Cools Tools. Paul E. Brunberg. *American Machinist,* v. 96, Mar. 3, 1952, p. 129-132.
Introduction, discussing advantages and disadvantages of CO_2 as coolant, is given by E. J. Tangerman. Use of solid or liquid CO_2 on hardened toolsteel, Ti alloys, Hastelloy, Inconel, and high-Ni and Cr-Co compositions.
(G21, TS, Ti, Ni, Cr, Co)

147-G. Arc Machining Makes Hard-to-Cut Jobs Easy. H. V. Harding, V. E. Matulaitis. *American Machinist,* v. 96, Mar. 3, 1952, p. 136-141.
Basically, the process consists of the development of a series of electrical discharges, called intermittent arcs, between an electrode and the surface of a metal workpiece in the presence of a fluid. Factors to be considered and applications. (G17)

148-G. How to Drill Titanium Alloys. *American Machinist,* v. 96, Mar. 3, 1952, p. 141.
Data on drilling, reaming and tapping the material, based on recent tests. (G17, Ti)

149-G. Titanium Ground by Lockheed. *American Machinist,* v. 96, Mar. 3, 1952, p. 175.
Some recent research on grinding Ti by Lockheed Aircraft Corp.
(G18, Ti)

150-G. New Cutting Methods Cope With Ever-Harder Alloys. *Business Week,* Mar. 15, 1952, p. 144-146, 148.
Use of dry ice to cool the workpiece and cutting tool in machining "unmachinable" alloys; i.e., high Cr, W, or Co, and Ti. The electric-arc machining method.
(G17, Ti, Cr, Co, W, SG-j)

151-G. Oil Speeds Metal Cutting. *Chemistry,* v. 25, Feb. 1952, p. 7-8.
See abstract of "Jet Stream Lowers Cutting Tool Temperatures" *Steel;* see Item 72-G, 1952. (G21)

152-G. Theory of Electric Spark Machining. E. M. Williams. *Electrical Engineering,* v. 71, Mar. 1952, p. 257-260. (To be published in *AIEE Transactions,* v. 71, 1952.)
The electric spark machining process is assuming industrial importance in the tool and die industry. A typical electric system for this process, and a theory for the mechanism of its operation together with results of experimental tests. 13 ref. (G17)

153-G. New Methods for Testing Machinability of Gray Iron. Edward A. Loria. *Foundry,* v. 80, Mar. 1952, p. 174-175, 178, 180, 182.
Experimental data on various types are tabulated and charted.
(G17, CI)

154-G. Manufacture and Use of Graphitic Tool Steels Show Vast Progress. Parts I and II. A. F. Sprankle. *Iron Age,* v. 169, Feb. 28, 1952, p. 100-103; Mar. 13, 1952, p. 106-110.
The effect of graphite content on machinability of toolsteels was studied. Milling energy vs. graphitic carbon content, and effect of graphitization on drilling torque and thrust. Data are graphed. Extensive tabular data on graphitic toolsteel applications. (G17, T6, TS)

155-G. What You Can Do About the Diamond Wheel Shortage. L. R. Metzger. *Iron Age,* v. 169, Mar. 6, 1952, p. 203-207.
The diamond wheel shortage and our dependence on the use of diamonds for truing grinding wheels used in precision, close-tolerance grinding of engine and machine parts and cemented carbide tools. (G18, C-n)

156-G. High Speed Machining—A Primer. George Elwers. *Iron Age,* v. 169, Mar. 6, 1952, p. 224-226.
Shows how high-speed machining reduces distortion of metal. Includes tabular data and photomicrographs. (G17)

157-G. Rolled Sections Replace Forged Jet Blades. *Iron Age,* v. 169, Mar. 6, 1952, p. 227.
Fabricating method which will replace forged blades in the compressor stator of the J-47 turbojet engine. Airfoil section of the blades is cut from stainless strip rolled to contour, attached to separately-formed bases by welding. Material savings: 39%. Cost savings: 55%. (G11, SS)

158-G. Russians Machine Bearing Balls Electro-Mechanically. Henry Brutcher, translator. *Iron Age,* v. 169, Mar. 13, 1952, p. 98-99. (From paper by N. A. Pankratov, P. B. Gofman, and M. M. Feldman, *Promyshlennaya Energetika,* Oct. 1950, p. 10-11.)
How low-alloy bearing balls are machined electromechanically at Russia's State Bearing Works. Balls roll between charged upper and lower disks. Lower disk rotates at 500

to 600 rpm. Micro-arcs soften ball surface and rotating disk throws off softened metal particles. Metal removal varies directly with voltage. Slightly pitted and decarburized surface of ball is removed by hard lapping. Balls can be fed into machine and removed automatically, giving high production rates. (G17, AY)

159-G. Shotpeening as a Factor in the Design of Gears. *Journal of American Society of Naval Engineers,* v. 64, Feb. 1952, p. 181-190.

Previously abstracted from *Machine and Tool Blue Book.* See item 9-G, 1952. (G23, Q23, Q9, ST)

160-G. Deep Drawing: Development of Aluminium Bronze Alloys for Dies. S. C. Jones. *Metal Industry,* v. 80, Feb. 22, 1952, p. 152-153.

Requirements of a successful die material and work undertaken by Rolls-Royce, in collaboration with N. C. Ashton, on the development of an Al bronze composition with a high Brinell hardness. Fabrication of the dies, including centrifugal sand casting, machining, and finishing. (G4, T5, Cu)

161-G. 2nd Biennial Meeting Concerning High Precision Mechanics. *Microtechnic* (English Ed.), v. 5, Nov.-Dec. 1951, p. 259-425.

A series of papers on various aspects of high-precision production and inspection, presented at Paris, Sept 5-10, 1951. Selected papers are separately abstracted. (G general, S general)

162-G. Superfinish in the Service of Precision. A. Meynier. *Microtechnic* (English Ed.), v. 5, Nov.-Dec. 1951, p. 309-314; disc., 315-316. (Translated from the French.)

Precision finishing, lapping, honing, new processes, and examples of mechanical super and micro-finishing. (G19)

163-G. Drawing Compounds From the Standpoint of Stampers. *Modern Industrial Press,* v. 14, Feb. 1952, p. 6, 8.

An analysis of the replies received to these questions: "Do you use different types of drawing compounds or lubricants for different metals?" and "If so, what are the different requirements for different metals?" (G21)

164-G. Plastic Tooling for Aircraft Production: New Phenolic Material Provides Means for Quick, Easy Casting of Wide Variety of Forming Tools. Frank Charity. *Modern Machine Shop,* v. 24. Mar. 1952, p. 144-148, 150.

Process by which low-viscosity phenolic casting resin is currently being used by western aircraft manufacturers as a means of lowering the cost, without minimizing the quality, of Hydropress form blocks, stretch press dies, drill jigs, check fixtures, assembly jibs, etc. (G general)

165-G. Stretch-Forming Magnesium. Robert B. Stanton. *Modern Machine Shop,* v. 24, Mar. 1952, p. 228, 230.

Internally heated stretch dies developed by North American Aviation and Consolidated Vultee Aircraft. (G9, Mg)

166-G. Forming Dies Made of Densified Wood. *Modern Metals,* v. 8, Feb. 1952, p. 34.

Forming dies made of wood impregnated with Bakelite phenolic resins are being used in the deep and shallow drawing of Al parts. The new material is called "Hi-Den"; applications in production of military and civilian parts. (G4, Al)

167-G. Press Load Calculations: Electronics Replaces Theory. *Steel,* v. 130, Mar. 10, 1952, p. 112-113.

How the complicated problem of determining accurately and instantly the actual loads developed in a press under production conditions is solved electronically by use of a new instrument. (G1)

168-G. Hot Forming Practice At Northrop Aircraft. Part II. Gilbert C. Close. *Steel Processing,* v. 38, Feb. 1952, p. 76-79.

Results of tests to determine the effects of various hot forming methods on mechanical properties of some Al alloys. (G general, Q general, Al)

169-G. Manufacture of Extruded Aluminum Cylindrical Containers With Clamped Tops. (In Italian.) P. Balduzzi. *Alluminio,* v. 20, Dec. 1951, p. 553-557.

Equipment and procedures of Italian plant for impact extrusion of cans. (G5, Al)

170-G. Oxygen Cutting of Steel by a Two-Flame Kerosene Torch. (In Russian.) S. V. Begun. *Avtogennoe Delo,* v. 22, May 1951, p. 24.

The apparatus. (G22, ST)

171-G. Reduction of the Zone of Plastic Deformation Taking Place During Machining of Metals Under the Action of Surface-Active Liquids. (In Russian.) G. I. Epifanov and L. A. Shreiner. *Doklady Akademii Nauk SSSR,* new ser., v. 80, Oct. 11, 1951, p. 781-782.

Depths of the zone of plastic deformation of aluminum under various conditions of machining were studied. Data are charted. (G17, Q24, Al)

172-G. (Book) Die Stanz-Ereitechnik in der Fein-Mechanischen Fertigung. (The Technique of Precision Press Work.) Paul Gabler. 198 pages. Carl

Hanser Verlag, Munich 27, Germany. $5.00.

Tooling for making precision stampings. Plastic flow in press-work. Includes sketches of tools and parts, plus tabular data. (G1)

173-G. Methods of Machining and Grinding Stellite; Techniques Employed by Deloro Stellite, Shirley, Birmingham. *Machinery* (London), v. 80, Feb. 14, 1952, p. 274-279. (G17, Co)

174-G. (Book) **Kholodnaia Obrabotka Metalla Uprochniaiushche-Kalibruiushchim Instrumentom.** (Cold Working of Metals by Means of a Hardening and Calibrating Tool.) V. O. Voishko. 83 pages. 1950. State Scientific-Technical Publishing House for Machine Construction Literature Moscow and Leningrad, U.S.S.R.

A method of finishing the surface of parts without removing chips, by knurling and flattening with rollers. Basic processes taking place in the metal during its deformation; influence of temperature, and of geometry of the rolls, and their influence on the worked surface. The problems of increasing fatigue strength and finish, treatment under compression, increased wear resistance, and measurement of forces during knurling. Behavior of several nonferrous metals, with attention largely confined to various steels. Graphs, tables, diagrams, and illustrations. 38 ref. (G general, Q general)

175-G. Impact Extrusion of Magnesium. T. L. Patton. *Machine Design,* v. 24, Mar. 1952, p. 225-226, 228. (A Condensation.)

Advantages of the process over other processes such as drawing. Operations involved. (G5, Mg)

176-G. Tools for the Impact Extrusion of Magnesium. George H. DeGroat. *Machinery* (American), v. 58, Mar. 1952, p. 162-167.

Tools and methods used. Design details for various examples. (G5, Mg)

177-G. Forming Sheet Metal With Low-Cost Tools. J. A. Whittingham. *Machinery* (American), v. 58, Mar. 1952, p. 186-191.

Flat sheet metal parts with flanges, holes, and other irregularities are formed in hydraulic presses using a rubber pad and form blocks. Recent advances in this method of forming have considerably reduced secondary manual operations. Some of these tooling improvements and an ingenious press arrangement employed in this process. (G8, ST)

178-G. New Production Facilities; a Brief Survey of the Machine-Tool Industry Today. Ralph J. Kraut. *Mechanical Engineering,* v. 74, Mar. 1952, p. 212-214, 218.

Background and functions of the machine-tool industry in peace and war, status of America's machine-tool equipment, and the machine tool of yesterday, today, and tomorrow.(G17, A4)

179-G. Plastic and Metal Shaping Operations Affect Tube Socket Design. Floyd McKnight. *Modern Industrial Press,* v. 14, Mar. 1952, p. 26, 28, 32.

The application of a plastic, "Kel-F" and silver-plated beryllium copper and phosphor bronze in the production of a socket for a transmitter tube. (G general, T1, Cu)

180-G. Method of Machining Carbide Die for Odd-Shaped Powder Part Illustrates New Way of Cutting Hard Materials. John S. Roller. *Precision Metal Molding,* v. 10, Mar. 1952, p. 47-50.

The electromechanical system of metal removal known under the trade name "Method X". (G17, C-n)

181-G. Some Practical Hints on Special Die Design. Federico Strasser. *Sheet Metal Industries,* v. 29, Mar. 1952, p. 230-234, 236.

Practical suggestions and simple solutions to problems encountered in practice as an aid in designing and building special cutting dies. Diagrams. (G general, T5)

182-G. Electrolytic Grinding: Stubborn Alloys Less Formidable. George Keeleric. *Steel,* v. 130, Mar. 17, 1952, p. 84-86.

The principles of removing stock by electrochemical action are applied successfully to the grinding of difficult-to-machine metals and metal carbides. Surface finish is excellent. (G18, C-n, SG-m)

183-G. The Renaissance in Metal Cutting. Milton C. Shaw. *Technology Review,* v. 54, Mar. 1952, p. 245-247, 264, 266, 268.

Research techniques for studying the metal-cutting process. Tool wear, plastic deformation, and metallography. (G17, M27, SG-m)

184-G. Oxygen Cutting of Defense Equipment Materials. A. H. Yoch. *Welding Journal,* v. 31, Mar. 1952, p. 217-229.

Setting up procedures or standards of control in order to secure the most satisfactory results for oxygen cutting of rolled alloy-steel plates, forgings, and castings on a production basis. Tabular data. (G22, AY)

185-G. Possibilities for Prestressing of Metallic Structures. (In French.) W. Soete. *Revue de la Soudure; Lastijdschrift,* v. 7, no. 4, 1951, p. 205-213.

See abstract from *Transactions of the Institute of Welding;* item 123-G, 1952. (G23, ST)

186-G. Methods of Investigating the Machinability of Metals. (In French.) Leon Czaplicki. *Revue universelle des Mines, de la Métallurgie des Travaux publics, des Sciences et des Arts appliqués a l'Industrie,* ser. 9, v. 95, Feb. 1952, p. 33-43.

Three possible types of chips. Mathematical analysis of the cutting phenomenon made by Merchant. Different methods of investigation. Micrographs, diagrams and tables. (G17)

187-G. The Lapping Process. (In German.) Hans H. Finkelnburg. *Metalloberfläche,* ser. A, v. 6, Jan. 1952, p. A9-A14.

Modern lapping practice and lapping machines. Diagrams, photographs, and graphs. (G19)

188-G. Economical Cleaning by Grinding of Round Parts Before Galvanizing. (In German.) W. Hofmann. *Metalloberfläche,* ser. B, v. 4, Jan. 1952, p. B1-B5.

Efficient methods. (G18, ST)

189-G. Oxygen Cutting During Preparation of Welded Structures for Building Construction. (In Russian.) M. M. Sakhovskii. *Avtogennoe Delo,* v. 22, July 1951, p. 19-22.

Experiments were made on the influence of oxygen cutting on the properties of edges and welded joints. A universal pattern for semiautomatic cutting. Deformation during cutting, preparation of edges, and organization of working area. (G22, T26, CN)

190-G. Testing the Durability of Cutting Tools Without Use of Laboratory Cutting Machines. (In Russian.) M. N. Nikolaichik. *Stanki i Instrument,* v. 22, June 1951, p. 18-20.

A formula was developed for evaluating cutting tools on the basis of factory data. Results are tabulated and charted. (G17)

191-G. Economic Aspects of Cutting Tool Life. H. J. Burmester. *Engineers' Digest,* v. 13, Feb. 1952, p. 45-49. (From *Werkstatt und Betrieb,* v. 84, Nov. 1951, p. 512-516.)

A thorough analysis. Economic implications of cutting-tool life rather than cutting conditions. (G17, TS)

192-G. New Machine Forms Jet Rings. *Iron Age,* v. 169, Mar. 27, 1952, p. 106-107.

New machine called a radial draw former forms rings by taking partially preformed strip, sheet, or plate, putting it in tension between two jaws, then wrapping it around a die. Little or no finish machining is required. Varied shapes may be formed. (G4)

193-G. Trepanning Makes Holes Faster. F. W. Lucht. *Iron Age,* v. 169, Apr. 3, 1952, p. 132-134.

See abstract of "Carbide Trepanning Accurate Bores in Record Time", *Steel;* item 198-G, 1952. (G17)

194-G. New Gas Cutting Techniques and Heavy Scrap Reduction. R. F. Helmkamp and A. H. Yoch. *Iron Age,* v. 169, Apr. 3, 1952, p. 135-137.

New technique utilizes an old gas cutting machine to reduce heavy scrap loaded on flat cars. (G22, ST)

195-G. Fabricating Titanium. *Modern Metals,* v. 8, Mar. 1952, p. 21-23.

Experimental results obtained by Ryan Aeronautical Co., San Diego, Calif., in exploring titanium's suitability for high-temperature applications in aircraft.
(G general, T24, Al)

196-G. Cutting Fluid Chemical Adheres to Metal. C. L. Davis. *Screw Machine Engineering,* v. 8, Apr. 1952, p. 60-63.

General Aniline and Film Corp. has developed a new type coolant which is said to provide good lubricity between cutting edge and workpiece, resist rancidity, and provide good antirust qualities. Contains new active ingredient which possesses an extremely strong affinity for metal surfaces. (G21)

197-G. Precision Spinning; Solves Ticklish Forming Problem. Bernard Blackman. *Steel,* v. 130, Mar. 24, 1952, p. 68-69.

Process by which perfect spherical segments for dials on aircraft gyro indicators are mass produced from Al by combining watchcase spinning techniques and die stamping. (G13, Al)

198-G. Carbide Trepanning Accurate Bores in Record Time. Fred W. Lucht. *Steel,* v. 130, Mar. 31, 1952, p. 74-75.

Rapid process which removes most of the inside diameter as a solid core instead of chips. Present boring machines can be converted for trepanning operations. (G17)

199-G. Shaping, Finishing Horizons Widen. *Steel,* v. 130, Apr. 7, 1952, p. 120, 140, 143, 144.

Electromechanical, electrochemical, and ultrasonic processes for shaping and finishing hard-to-work materials in addition to conserving limited supplies of diamond bort. Eight specific operations where new processes for machining and grinding may be needed are emphasized. (G17, G18)

200-G. Specialty Die Designs for Stamping and Forming. Part I. The Marform Process. Lester F. Spencer. *Steel Processing,* v. 38, Mar. 1952, p. 121-127.

Application to miscellaneous ferrous and nonferrous metals and alloys. Recommended dimensions are tabulated. (G1)

201-G. Electro-Mechanical Machining of Hard Materials. Malcolm F. Judkins. *Tool Engineer,* v. 28, Apr. 1952, p. 48-50.

Conventional processes, and arc disintegration, electrolytic spark, and electromechanical machining, and their applications.
(G17, TS, C-n, SG-m)

202-G. Giants for Cutting. *Welding Engineer,* v. 37, Apr. 1952, p. 35.

Multiple-torch flame-cutting machines at the Manitowoc Shipbuilding Co., Manitowoc, Wis. Each has a 16-ft. wide cutting table, a travel of 25 ft. lengthwise, and will do both straight-line and shape cutting.
(G22, CN)

203-G. Progressive Die With Dial Transfer Device. *Machinery* (London), v. 80, Feb. 21, 1952, p. 331-333.

Developed for production of stampings designed to hold 35-mm. film. (G3)

204-G. QM Group Inspects Crown Stove Works. *Better Enameling,* v. 23, Mar. 1952, p. 8-15.

Picture story of miscellaneous equipment and procedures used in stove fabrication at Cicero, Ill., plant. Includes presswork, shearing and trimming, machining, drilling, welding, enameling, assembly, etc.
(G general, K general, L26, CN)

205-G. Evaluating Machinability of Rolled Steels, Forgings, Cast Irons. Michael Field and Norman Zlatin. *Canadian Metals,* v. 15, Apr. 1, 1952, p. 40-42.

Examples of procedures on several representative problems arising in industry are cited to illustrate the approach in evaluating machinability. Low carbon steels with S added, medium alloy carbon steels, automotive steel forgings, and cast iron. Tabular data.
(G17, CN, AY, CI, SG-k)

206-G. Conserve Diamond Bort and Cut Hard-To-Machine Materials With New Machining Processes. *Journal of Metals,* v. 4, Apr. 1952, p. 378-380.

New processes including electrolytic, electric-spark, electric-arc, and ultrasonic methods for shaping and finishing cemented-carbide tools and tungsten carbide projectile cores.
(G17, C-n)

207-G. How to Cut Heavy Steel Sections. *Linde Tips and Oxy-Acetylene Tips,* v. 31, Apr. 1952, p. 29-31.

How to cut heavy steel sections with a hand-cutting blowpipe.
(G22, ST)

208-G. Basic Forming Techniques for the Copper Base Alloys. Part I. Lester F. Spencer. *Tool Engineer,* v. 28, Apr. 1952, p. 56-59.

Includes tabular data on composition; and on mechanical, physical, and fabrication properties. (To be continued.)
(G general, Q general, P general, Cu)

209-G. (Book) Increased Production, Reduced Costs Through a Better Understanding of the Machining Process and Control of Materials, Tools, Machines. Vol. 2. 196 pages. 1951. Curtiss-Wright Corp., Wood-Ridge, N. J.

Concentrates on one aspect—the effect of microstructures of plain carbon, alloy, and stainless steels on tool life. Includes effects of machining practice on residual stress and endurance limit; recent developments in the machining of Ti and its alloys. Numerous micrographs, charts, and tables.
(G17, M27, ST, Ti)

210-G. Stretch-Forming. Part II. Tooling Methods and Examples of Forming Procedure on the Sheridan Longitudinal Machine. Richard Wood. *Aircraft Production,* v. 14, Apr. 1952, p. 116-123.

Forming dies for use on the Sheridan stretch-forming machine can be made in a number of materials including wood, zinc alloy and concrete. (G9, Zn)

211-G. Die Design for Metal Drawing. Charles R. Cory. *Better Enameling,* v. 23, Apr. 1952, p. 22-23, 25-28, 33.

The forming of parts from flat sheets of metal. (G4, ST)

212-G. Diamond Grinding Wheels and Their Application. W. Peter. *Industrial Diamond Review,* v. 12, Mar. 1952, p. 47-48.

Diamond grinding wheels for machining hard materials. Characteristics are tabulated. Type of bond and bond material—steel alloy, special bronze, Cu, special cast iron and synthetic resin. (G18, AY, Cu, CI)

213-G. Hydroforming Proves Economical in Small Shop. Rhodes Danehower. *Iron Age,* v. 169, Apr. 10, 1952, p. 124-125.

Process and advantages of hydroforming. Alloys successfully drawn by Alloy Products include Inconel, L-605, Al, stainless steel, stainless-clad Cu, brass, and aluminized steel.
(G8, Al, SS, Cu, ST, Ni)

214-G. How to Machine Titanium. D. C. Goldberg and W. S. Hazelton. *Iron Age,* v. 169, Apr. 17, 1952, p. 107-110.

Data is from joint Navy-Westinghouse research, and covers turning, broaching, drilling, tapping, reaming, and milling. Use of carbon dioxide gas as coolant wherever possible is recommended. Based on actual production experience. (G17, Ti)

215-G. Three Dies Form Stainless Steel Pitchers—All in One Stroke of the Press. Paul Prikos. *Machine and Tool Blue Book,* v. 48, Apr. 1952, p. 153-160.

Described, diagrammed, and illustrated. (G4, SS)

216-G. The Use of Carbides in Trepanning. Fred W. Lucht. *Machine and Tool Blue Book,* v. 48, Apr. 1952, p. 166, 168-171, 173-174.

See abstract of "Carbide Trepanning Accurate Bores in Record Time", *Steel;* item 198-G, 1952. (G17, C-n)

217-G. Automatic Tank Transmissions Demand Close Tolerances. Donald F. Taylor. *Machinery* (American), v. 58, Apr. 1952, p. 141-148.

Machining and flame hardening equipment and procedures at Buick Motor Div., General Motors Corp., Flint, Mich. Materials are Al alloys and alloy steels. (G17, J2, Al, AY)

218-G. Set-Ups That Expedite Camera Production. Herbert Chase. *Machinery* (American), v. 58, Apr. 1952, p. 180-185.

Presswork operations and projection welding of Al strip in production of Eastman cameras. (G1, K3, Al)

219-G. Russian Practice in Machining With Cemented Carbides. N. H. Polakowski. *Machinery* (London), v. 80, Mar. 27, 1952, p. 540-543.

Recent developments in carbide tool design and the performances said to be obtained in the U.S.S.R. Limited to single-point machining. Deals with cast iron, 50-ton, hardened, and heat resisting austenitic steel. Tables and diagrams. (G17, CI, ST)

220-G. Squirt Outdoes Flood in Cooling Cutting Tools. *SAE Journal,* v. 60, Apr. 1952, p. 45-48. (Based on "Hi-Jet System for Increasing Tool Life," by R. J. S. Pigott and A. T. Colwell, to be published in full in SAE Quarterly Transactions.)

See abstract of "Jet Stream Lowers Cutting Tool Temperatures", *Steel;* item 72-G, 1952. (G21)

221-G. New Horizons for Aero Machining. Malcolm F. Judkins. *SAE Journal,* v. 60, Apr. 1952, p. 49-52.

Reviews proceedings of Los Angeles forum. New techniques and equipment for different shapes and materials. (G17)

222-G. 25 Years in the Sheet-Metal-Working Industry; a Survey. J. W. Langton. *Sheet Metal Industries,* v. 29, Apr. 1952, p. 293-300.

Changes and developments which have taken place in the sheet-metal-working industry. (G general)

223-G. The Neutral Line and Its Application to Bend Allowances. A. Dickason. *Sheet Metal Industries,* v. 29, Apr. 1952, p. 327-331, 333.

Includes diagrams and formulas. (G6)

224-G. Forming Stainless on Regular Shop Equipment. E. M. Rains. *Sheet Metal Worker,* v. 43, Apr. 1952, p. 44-45.

(G general, SS)

225-G. Press Forming Sheet Metals. Part I and II. Lester F. Spencer. *Sheet Metal Worker,* v. 43, Mar. 1952, p. 46-47, 86; Apr. 1952, p. 46, 48-50.

Part I: Operations such as blanking, punching, perforating, trimming, etc., in semi-production, sheet-metal shops; related factors that affect these operations. Operations involving a shearing action. Part II: Methods involving bending in the forming of shapes, which are confined to several specific designs of equipment. Factors influencing press-brake forming. (G1)

226-G. How to Hot-Form a Dimple. Thomas A. Dickinson. *Steel Processing,* v. 38, Apr. 1952, p. 172-174.

Method which avoids cracking in rivet hole forming of Al, Mg, Ti, and some alloy steels. (G2, Al, Mg, Ti, AY)

227-G. Oxygen-Flux Surface Cutting of High-Chromium Steels. (In Russian.) S. G. Guzov and O. Sh. Spektor. *Avtogennoe Delo,* v. 22, Sept. 1951, p. 19-22.

The removal of surface defects from ingots and billets by oxygen cutting. Influence of torch design and other factors. Apparatus is diagrammed; results are charted and tabulated. (G22, SS)

228-G. Cutting With Ultra-High Purity Oxygen. E. H. Roper and J. F. Kiernan. *American Foundrymen's Society,* Preprint 52-57, 1952, 9 pages.

Experiments to determine effects of O_2 purities between 99.0 and 99.83% on cutting and starting of cuts on steel plate, billets, and cast steel sections. These studies show a straight-line relation between O_2 purity and cutting efficiency for

the region explored. Starting times were independent of purity. Economic analysis indicates insufficient gains for commercial adoption. (G22, ST)

229-G. Titanium Tests Tools, Talent. *American Machinist,* v. 96, Apr. 28, 1952, p. 91-96.

Mechanical properties, formability, and riveted joints Ti, and Ti-alloy sheet. Stresses information that can be applied directly to shop operations. (G general, Q general, K13, Ti)

230-G. Plastics Equipment and Technique. Denis A. Dearle. *American Machinist,* v. 96, Apr. 28, 1952, p. 107-122.

A general survey of the equipment and tooling in the plastics field: presses, molds, molding techniques, product design, and finishing. An introduction to the mutual areas in which metalworking and plastics must work together: tools and equipment. (G general, T29)

231-G. Machining Data on High Temperature Alloys. P. G. DeHuff and D. C. Goldberg. *Automotive Industries,* v. 106, May 1, 1952, p. 46-49, 82, 86.

Analysis of some of the alloys used in jet engines. Parts application for these alloys. Shear strength, coefficient of friction and machining constant—plus the hardness, strain hardenability, and the amount of abrasive particles on the metal all affect the inherent machining qualities of the alloy. Summarizes the effect of these factors upon inherent machinability. (G17, Ti, SS, Ni)

232-G. Increasing Productivity in Production Machining. Michael Field and Norman Zlatin. *SAE Quarterly Transactions,* v. 6, Apr. 1952, p. 196-212.

The methods fall into two categories: reduction in time of performing the handling, clamping, rapid traversing, and other machine functions necessary to bring the workpiece to the cutting tool; and reduction in time necessary to machine the metal. Numerous graphs and photomicrographs of cast irons. (G17, CI)

233-G. Design and Manufacturing Techniques With Titanium. O. A. Wheelon. *SAE Quarterly Transactions,* v. 6, Apr. 1952, p. 373-384.

Determining the characteristics of the material and making designing and manufacturing practices compatible. Photographs. (G general, Ti)

234-G. Jet Alloys Toss Challenge to Machine Tools. P. G. DeHuff and D. C. Goldberg. *Steel,* v. 130 Apr. 28, 1952, p. 76-78.

Need for new tooling methods and machines for producing jet-engine parts. (G17, SG-h)

235-G. Magnesium Fabrication. Lower Finished Costs. *Steel,* v. 130, May 5, 1952, p. 98-101, 118, 121, 124.

Evaluates various fabricating techniques. (G general, Mg)

236-G. Die Design for Metal Drawing. Charles R. Cory. *Tool Engineer,* v. 28, May 1952, p. 48-51.

Considerations for binding; margin of safety between wrinkles and tears; inequality of developed draw lengths; drawing of deep depressions; use of shear steels; and drawing of a door inner panel. (G4)

237-G. Carbide Does the Job. Carbide Tools Also Make Profits in Civilian Work. James Blane. *Western Machinery and Steel World,* v. 43, Apr. 1952, p. 110-111.

Production of carbide tools at Tool Specialty Co., on the West Coast. (G17, T6, C-n)

238-G. Present Research on Improving the Economy of the Oxygen-Cutting Process. (In French.) M. Renaudie. *Revue de la Soudure; Lastijdschrift,* v. 8, Jan. 1952, p. 40-44.

See abstract from *Soudure et Techniques Connexes,* item 114-G, 1952. (G22)

239-G. Methods of Research on the Machinability of Metals. (Concluded.) (In French.) Léon Czaplicki. *Revue Universelle des Mines, de la Métallurgie des Travaux publics, des Sciences et des Arts Appliqués a l'Industrie,* ser. 9, v. 95, Mar. 1952, p. 76-89.

Measurement of cutting forces, microhardness, cold hardenability, life of the tool, feed at constant temperature, cutting temperatures, and heat released during cutting. Includes schematic drawings, charts, and tables. 19 ref. (G17)

240-G. Continuous Fabrication of Light-Metal Automobile Bodies. (In German.) J. Baron. *Aluminium,* v. 28, Mar. 1952, p. 62-68.

Choice of alloys, sheet thickness, and deep drawing problems. (G4, Al)

241-G. The Oxygen Lance, and Its Application for Burning Holes Into Concrete, Minerals, and Steel. (In German.) R. Wolf and E. Zorn. *Schweisstechnik,* v. 6, Feb.-Mar. 1952, p. 13-18.

Economic and technical advantages of specialized applications. Data are tabulated and charted. (G22, ST)

242-G. Influence of Purity of Oxygen on the Process of Oxygen Surface Cutting. (In Russian.) A. K. Ninburg. *Avtogennoe Delo,* v. 22, Oct. 1951, p. 13-16.

Investigated on low-carbon steel. It was found that O_2 of less than 95% purity is not satisfactory; for a given purity there is an optimum rate corresponding to the maximum productivity of the cutter and minimum use of O_2. Tables and graphs. (G22, CN)

243-G. Dynamics of Rapid Machining. (In Russian.) A. M. Rozenberg and Iu. P. Zimin. *Stanki i Instrument,* v. 22, Sept. 1951, p. 11-13.

Influence of cutting rate on cutting force during machining of steel. Tables and graphs. (G17, ST)

244-G. The Process of Forming Elementary and Compact Steel Chips. (In Russian.) M. I. Klushin. *Stanki i Instrument,* v. 22, Sept. 1951, p. 14-15.

Mechanism of chip formation during machining. (G17, ST)

245-G. Cutting Force During the Formation of Metallic Chips. (In Russian.) T. N. Lopadze. *Stanki i Instrument,* v. 22, Sept. 1951, p. 15-16.

Equations are developed to express cutting force. (G17)

246-G. Dependence of Cutting Rate and Stability on Feed Rate During Rapid Milling. (In Russian.) L. A. Rozhdestvenskii. *Stanki i Instrument,* v. 22, Sept. 1951, p. 17-18.

Experiments were conducted on several steels. Data are charted. A note by the editor takes exception to some of the author's statements. (G17, ST)

247-G. The Significance of Circumferential Forces During Face Milling Using Hard-Alloy Cutters. (In Russian.) A. I. Kashirin and V. Ia. Rassokhim. *Stanki i Instrument,* v. 22, Oct. 1951, p. 6-8.

The dependence of circumferential forces on cutting speed, depth of cut, feed per tooth, and face angle was determined. Data are tabulated and charted. (G17)

248-G. Grinding Carburized and Nitrided Steels With "Monocorundum" Wheels. (In Russian.) M. S. Rakhmarova. *Stanki i Instrument,* v. 22, Oct. 1951, p. 14-16.

A new abrasive material "monocorundum" was shown to be superior for grinding carburized and nitrided steel articles. Characteristics of a variety of abrasive wheels are charted. (G18, ST)

249-G. Properties of High-Speed Steel (E1347). (In Russian.) E. I. Malinkina, S. I. Volkov, Z. N. Arkhangel'skaia, and A. A. Badaeva. *Stanki i Instrument,* v. 22, Oct. 1951, p. 17-18.

Cutting tools and end mills made from three types of high speed steel were compared. Advantages and disadvantages of steel EI347 are given particular attention because of its low W and V contents. Data are tabulated and charted. (G17, T6, TS)

250-G. Influence of Specific Gravity of Hard Alloys on the Cutting Qualities of Tools. (In Russian.) M. N. Nikolaichik. *Stanki i Instrument,* v. 22, Oct. 1951, p. 20-21.

Experiments on cemented-carbide tools. Increased specific gravity accompanied decreased wear resistance. Graphs. (G17, Q9, C-n)

251-G. Glass Forming-Tools. J. Rees and P. K. Digby. *Aircraft Production,* v. 14, May 1952, p. 148-150.

Small-batch production of tools for making components from light-alloy sheet. Tool types covered are heating blocks, rubber-die press tools, and drop-hammer tools. Limitations and advantages. (G1)

252-G. Oil Jet Hits Spot, Stretches Tool Life. *Aviation Week,* v. 56, May 19, 1952, p. 39-40, 42, 45.

Hi-Jet process developed by Gulf Research & Development Co. (G21)

253-G. Flame-Cutting Reduces Cost of Jolt-Free Bridge Expansion Joints. *Engineering News-Record,* v. 148, May 8, 1952, p. 67.

Flame-cutting procedure at By-Products Steel Co., a division of Lukens Steel Co., Coatesville, Pa. (G23, CN)

254-G. Exhaust Ventilation For Machining Metals of High Toxicity. H. F. Schulte, E. C. Hyatt, and F. S. Smith, Jr. *Heating, Piping & Air Conditioning,* v. 24, May 1952, p. 86-89.

See abstract of "Exhaust Ventilation for Machine Tools Used on Materials of High Toxicity", *A.M.A. Archives of Industrial Hygiene and Occupational Medicine;* item 91-G, 1952. (G17, A7, U, Th, Be, Tl, Pb)

255-G. Better Design Permits Cheaper Stampings. Frederico Strasser. *Iron Age,* v. 169, May 8, 1952, p. 113-115.

Design tricks that can cut stock waste, die cost, and scrap rate. (G3)

256-G. Shape Flash to Speed Production—Cores Simplify Machining of Flash Welded Parts. J. Conlogue. *Iron Age,* v. 169, May 8, 1952, p. 126-127.

Method of removing weld spatter from inside welded track roller. Two specially shaped cores are inserted before flash welding. These shape the contour of the weld spatter, collecting some and making the balance easily broken and pushed out by a small hydraulic press. (G17, K3)

257-G. "Adaptineering" Speeds Fabrication of Light Metals. Roy Fellom, Jr. *Light Metal Age,* v. 10, Apr. 1952, p. 8-9.

Several methods used at Moss Engineering Co., Elkridge, Md., to get around problems caused by machine tool shortages. Special die block arrangement; circle cutting; sawing flanges and drawn forms. The company is producing precision Al and Mg sheet products.
(G general, Al, Mg)

258-G. How Oils Should Be Used in Metal-Cutting and Grinding. Lee Ballard. *Machinery* (American), v. 58, May 1952, p. 182-184.

Types of cutting fluids in common use and factors influencing their selection, oils suitable for use in machining steels and Cu alloys, selection of oils for use on Al and Mg, application of heavy-duty soluble oils, and prevention of skin infection resulting from the use of cutting fluids. (G21)

259-G. Finishing Cast Iron Skillets. Walter Rudolph. *Metal Finishing,* v. 50, May 1952, p. 60-61.

Mechanical finishing and protective coating at Griswold Mfg. Co., Erie, Pa. (L general, CI)

260-G. Impact Extrusion of Magnesium. T. L. Patton. *Metal Industry,* v. 80, Apr. 25, 1952, p. 323-325.

See abstract from *Machine Design;* item 175-G, 1952. (G5, Mg)

261-G. Cold Extrusion of Steel Shell at Heintz Mfg. Co. *Metal Progress,* v. 61, May 1952, p. 72-74.

Process at the plant in Philadelphia. Low-carbon steel is used with punches and dies of high-carbon steel or toolsteel. (G5, CN, TS)

262-G. High-Speed Toolsteels. *Metal Progress,* v. 61, May 1952, p. 146, 148, 150, 152. (Condensed from "Tungsten and Molybdenum as High-Speed Steel Tool Materials. Part 2. Molybdenum, Tungsten-Molybdenum and Cast Chromium Tungsten High Speed Steels. K. J. B. Wolfe.)

Previously abstracted from *Alloy Metals Review.* See item 372-G, 1951. (G17, J general, T6, TS)

263-G. "Orange-Peeling" of Aluminum. *Metal Progress,* v. 61, May 1952, p. 184, 186. (Condensed from "Overcoming Orange Peeling on Stretch-Pressed Aluminum Alloy Aircraft Skinning", G. W. Weeks.)

Previously abstracted from *Metallurgia.* See item 77-G, 1952.
(G9, J23, Al)

264-G. High Temperature Alloys Challenge Accepted Machining Methods. P. G. DeHuff and D. C. Goldberg. *Modern Machine Shop,* v. 24, May 1952, p. 98-104, 106, 108, 110, 112, 114.

See abstract of "Machining Data on High Temperature Alloys", *Automotive Industries,* item 231-G, 1952. (G17, Ti, SS, Ni)

265-G. Machining Magnesium. Frank Charity. *Modern Machine Shop,* v. 24, Apr. 1952, p. 114-116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144; May 1952, p. 138, 140, 142.

A summary covering unique properties of Mg together with recommended methods of machining it and its alloys. Fire hazards and preventive measures. Polishing methods. Tables. (G17, L10, Mg)

266-G. Unusual Presses and Dies. C. W. Hinman. *Modern Machine Shop,* v. 24, May 1952, p. 166, 168, 170, 172, 174, 176, 178, 180.

A press brake machine with tilt control to a thousandth of an inch. A tooling setup eliminating die time in broaching forged steel steering knuckles. A method for annealing only the neck of a tube or can. A pull-down press which handles extra-wide die sets on a comparatively narrow bed. A drawing-die setup for shells with square corners and flat trimmed edges. (G1, J23)

267-G. Dynatomics Concept of Metal Removal. *Screw Machine Engineering,* v. 13, May 1952, p. 55-57.

See abstract of "New Metal Cutting Concept Lengthens Tool Life", *Steel;* item 87-G, 1952. (G17)

268-G. A Particular Problem in the Re-Design and Development of a Pressed-Metal Assembly. (Concluded.) J. A. Grainger. *Sheet Metal Industries,* v. 29, May 1952, p. 417-426.

Applied to an automatic air-filter assembly. (G1)

269-G. Basic Forming Techniques for the Copper Base Alloys. Part II. Lester F. Spencer. *Tool Engineer,* v. 28, May 1952, p. 62-65.

Causes of stress cracking and its prevention in various groups of forming operations. (To be continued.) (G general, Q25, Cu)

270-G. Fabricated Deep-Drawing Press. *Welding & Metal Fabrication,* v. 20, May 1952, p. 158-161.

A newly designed 1200-ton, triple-action, hydraulic, deep drawing press for work particularly on work-hardening-materials. It is made by Foster Yates & Thom, Ltd., Blackburn, England. Includes welding operations used in its construction.
(G4, K general)

271-G. Precision Flame-Machining of Gears and Sprockets. Glenway Max-

on. *Welding Engineer,* v. 37, May 1952, p. 34-36.

Special flame-cutting machines developed for toothed wheels. Large gears having many teeth can be cut in short time. (G22, ST)

272-G. New Cutter-Tip Designs for Mechanization of Gas Cutting. (In Russian.) Ia. D. Rinskii and G. A. Bolkhovskoi. *Avtogennoe Delo,* v. 22, Nov. 1951, p. 27-28. (G22)

273-G. Theoretical Analysis of the Process of Drawing Sheet Metal. (In Russian.) I. A. Noritsyn. *Izvestia Akademii Nauk SSSR,* Section of Technical Sciences, Nov. 1951, p. 1696-1703.

An analysis is made of the stress states in the various stages of drawing processes. Formulas for optimum operating parameters are proposed based on ultimate strength, resistance to deformation, radius of curvature, and thickness of metal. Schematic diagrams. (G4)

274-G. (Book) **Production Processes; Their Influence on Design.** Vol. II. Roger W. Bolz. 357 pages. Penton Publishing Co., Cleveland 13, Ohio. $7.50.

Groups a wide range of manufacturing methods under four headings: casting methods—sand, permanent-mold, centrifugal, investment, and others; molding methods—powder, plastics, rubber, ceramics; fabricating methods—welding, brazing; and treatment methods—heat treating, shot peening. Each chapter includes design detailing, material selection, and shop tolerances. (G general, E general, K general, H general, J general)

275-G. (Book) **Metody Opredelenia Obrabatyvaemosti Metallov.** (Methods of Determining the Workability of Metals.) E. I. Fel'dshtein. 143 pages. 1946. State Scientific-Technical Publishing House for Machine-Construction Literature, Moscow, U.S.S.R.

Reviews classical methods which entirely reproduce the corresponding type of machining, accelerated methods of investigation based on short-time tests, and the relation between mechanical properties of metals and their workability. Emphasis is on "face machining"; and experimental verification of applicability of this method is presented. 75 ref. (G17, Q23)

276-G. (Book) **Skorostnoe Frezerovanie Stali.** (High-Speed Machining of Steel.) P. P. Grudov, S. I. Volkov, and V. M. Vorob'ev. 259 pages. 1950. Central Bureau of Technical Information, Moscow, U.S.S.R.

The theory of cutting and its application to the design of lathes and milling machines. Production of cutting tools, and operation of different types of automatic and semi-automatic mill machines. Numerous tables, diagrams, and illustrations. 41 ref. (G17, ST)

277-G. How to Shear to Closer Limits. J. J. Murphy. *American Machinist,* v. 96, May 26, 1952, p. 102-105.

How standard equipment can be applied to get better shearing at lower cost, both at the shears and on subsequent operations. Diagrams and illustrations. (G15)

278-G. Coining Controls Thickness and Location of Shell Flange. *American Machinist,* v. 96, May 26, 1952, p. 106-108.

Production of gyro-coil housing from high-Ni iron alloy sheet. Diagrams and illustrations. (G3, Fe, Ni)

279-G. Sandwich Structures Are Simple. *American Machinist,* v. 96, May 26, 1952, p. 118-119.

Northrup, Boeing, and Lockheed provide some information on manufacture and fabrication of sandwich structures. (G17)

280-G. Correct Curves for Carbide. *American Machinist,* v. 96, May 12, 1952, p. 142.

A combination induction and mechanical bending method successfully used in bending and twisting helical carbide inserts for milling cutters. Photographs. (G6, J2, C-n, SG-j)

281-G. Jet Engine Parts Made on Huge Presses. *Automotive Industries,* v. 106, May 15, 1952, p. 54.

Operations at Ryan Aeronautical utilizing 600-ton Warco presses to stamp out parts for exhaust cones, transition liners, aft frames, and other jet components. (G3)

282-G. Abrasive Belt Machine Grinds Jet Blade Airfoils. George Elwers. *Iron Age,* v. 169, May 15, 1952, p. 126-128.

Machine is controlled by four cams. One operator can handle several of these machines. (G18)

283-G. Sharpening Carbide Tools by the Electric Spark Method. W. N. Ulitin. *Machinery* (London), v. 80, May 1, 1952, p. 760-764. (Translated and condensed.)

Previously abstracted from *Stanki i Instruments.* See item 39-G, 1951. (G18, SG-j)

284-G. Metallurgical Factors Influencing Machinability. *Machinery* (London), v. 80, May 8, 1952, p. 813-814. (Based on paper by K. J. B. Wolfe and Peter Spear.)

The factors of hardness, microstructure, soft metal additions, and

nonmetallic inclusions. Deals with carbon and toolsteel and brass. (G17, CN, TS, Cu)

285-G. Machining Magnesium Alloys. *Magazine of Magnesium,* May 1952, p. 10-15.

Advantages over other commercially used metals include high machine speeds, low power requirements, minimum tool wear, and smooth finish. 30 pages of tabular data and recommended tool design for the machining of Mg. (G17, Mg)

286-G. Trepanning Speeds Boring Holes in Heavy Metal Sections. Fred V. Lucht. *Materials & Methods,* v. 35, May 1952, p. 174, 176, 178, 180.

See abstract of "Carbide Trepanning Accurate Bores in Record Time", *Steel;* item 198-G, 1952. (G17)

287-G. Specialty Die Designs for Stamping and Forming. Part III. The Sol-A-Die Process. Lester F. Spencer. *Steel Processing,* v. 38, May 1952, p. 234-239, 257.

Developed for small-quantity production of irregular shapes of complex design. The process is based on the principle that most of the required deformation can be obtained in a first-stage die with subsequent development primarily by elastic distortion. Used for such metals as stainless steel and aluminum. Diagrams and photographs. (G3, SS, Al)

288-G. Machining of Aluminum and Its Alloys. (In German.) K. Specht. *Aluminium,* v. 28, May 1952, p. 146-150.

Details, not only of tool shapes for a variety of operations, but also of permissible rates. Diagrams and graphs. (G17, Al)

289-G. New Type Hydraulic Press for Forming Aircraft Parts. *Automotive Industries,* v. 106, June 1, 1952, p. 56, 128.

Wheelon direct hydraulic press designed to accomplish the relatively shallow forming which constitutes the bulk of sheet-metal fabrication in airframe manufacture. The working pad is softer than those employed in conventional rubber-pad presses. (G4)

290-G. Method X Electro-Mechanical Machining. Malcolm F. Judkins. *Canadian Metals,* v. 15, May 1952, p. 56-58.

See abstract under similar title. *Tool Engineer,* item 201-G, 1952, (G17, TS, C-n, SG-m)

291-G. Hole Punching in the Sheet Metal Industry. R. Weisbeck. *Canadian Metals,* v. 15, May 1952, p. 66, 68.

Self-contained hole-punching unit incorporates a spring stripper with the blanking die. Units produce varying hole patterns. (G2)

292-G. Hot Forming With Resistance Heat. *Electrical Manufacturing,* v. 49, June 1952, p. 144-145.

Equipment and process developed by Westin Process Co., Elm Grove, Wis., for various hollow parts. Resistance welder transformer supplies high amperage current to the workpiece through die contacts. (G general, ST)

293-G. Instruments for Force and Temperature Measurement in Metal Cutting. H. Opitz and K. Küsters. *Engineers' Digest,* v. 13, May 1952, p. 145-148. (Translated and condensed from *Werkstatt und Betrieb,* v. 85, Feb. 1952, p. 43-47.)

Instruments include tool-force dynamometers used for measuring forces when turning and shaping or planing. Four such instruments were developed, covering a range from 50 to 15,000 kg. A measuring system using strain gages was developed also. Photographs, schematic diagrams, and oscillograms. (G17, S18)

294-G. More About Carbon-Arc Cutting and Gouging. Hubert Chappie. *Industry & Welding,* v. 25, June 1952, p. 70, 73-79.

Additional information supplementing article in Oct. 1951, issue: item 346-G, 1951. (G22)

295-G. Here's How to Flame Cut Pipe on a Production Line Basis. *Industry & Welding,* v. 25, June 1952, p. 88-89.

Procedures at Colonial Iron Works Co., Cleveland. (G22, ST)

296-G. Another Electro-Machining Method Shows Promise. I. Weber. *Iron Age,* v. 169, May 29, 1952, p. 88-90.

Electro-erosive machining method, combining electrolytic and electro-arcing effects being developed at Frankford Arsenal. Hardness has no effect on cutting time. But thinner wheels, more current, and higher wheel speed, all reduce cutting time. Method can be used for cutting or grinding carbides. Machine now being built will be capable of cutting, tool grinding, boring, and chip-breaker grinding. (G17)

297-G. Studies on the Surface Roughness of Metals Finished by Cutting. (In English.) Norio Takenaka. *Japan Science Review,* v. 2, Aug. 1951, p. 147-158.

In order to investigate the effect of the built-up edge on surface roughness in the cutting direction, 0.1% C mild steel and high speed steel were used for test pieces and tool respectively. A round bar, 30 mm. in diam. and 100 mm. long, on the surface of which were grooved

square threads of 2-mm. pitch, was placed in a lathe, and the thread crests cut with tools having single straight edge. Numerous diagrams, surface profiles, and graphs. (G17, S15)

298-G. Influence of Point of Application of Cutting Oil on Tool Life. William E. Lauterbach. *Lubrication Engineering*, v. 8, June 1952, p. 135-136.

Results of experiments on life of a single-point tool in a lathe-turning operation. (G17)

299-G. Compact, Powerful Machine Cuts Cost of Forming Shallow Parts. *Machine and Tool Blue Book*, v. 48, June 1952, p. 147-151.

A new direct-acting, hydraulic, metal-forming machine, one-tenth the size of conventional presses, yet capable of exerting up to three times the pressures currently used to form sheet metal parts used in airplane construction. Use will not be limited solely to the aircraft industry. (G1)

300-G. The Hot Working of Metals. H. K. Barton. *Machinery* (London), v. 80, May 15, 1952, p. 848-852.

Mass production of bolts, cap-screws, and similar items. Mechanical features such as die design and sequence of operations. Importance of stressing metal in compression, and special requirements for light-alloy forgings. Diagrams. (G10, F22)

301-G. Unusual Presses and Dies. C. W. Hinman. *Modern Machine Shop*, v. 25, June 1952, p. 176-178, 180, 182, 184.

A percussion-type power press and a cold-extrusion method. Equipment made by Zeh & Hahnemann Co. Includes heavy broaching of rectangular holes and cold extrusion of steel by various companies. (G1, F24, ST)

302-G. Hydroforming: a New Principle in Deep Drawing. *Modern Machine Shop*, v. 25, June 1952, p. 214-218.

Hydroforming is deep drawing by use of a punch working upward into a flexible die member, which acts as a universal die. Applied to wide range of drawing operations on steel, Al, Mg, Cu, brass, plastics, insulating materials, and precious metals. Diagrams and photographs. (G8, ST, Al, Mg, Cu, EG-c)

303-G. Tips on Forming 17 Chromium Stainless. *Steel*, v. 130, June 9, 1952, p. 95.

Recommendations of R. M. Nelson, Armco Steel Corp., for bending and forming this grade. (G6, SS)

304-G. Basic Forming Techniques for the Copper Base Alloys. Part III. Lester F. Spencer. *Tool Engineer*, v. 28, June 1952, p. 61-64.

Cupping, redrawing, coining, stamping, embossing, cold heading, and similar operations. Selection of tools and lubricants. (G general, Cu)

305-G. Forming Tools for Magnesium Alloys. John Starr. *Tool Engineer*, v. 28, June 1952, p. 69-70.

Stamping dies with integral heating elements, developed at Consolidated Vultee Aircraft Corp. Diagrams and illustrations. (G3, Mg)

306-G. Sawing. (In French.) Gaston Laval and Rene Schweyckart. *Revue de l'Aluminium*, v. 29, Feb. 1952 p. 71-78; Mar 1952, p. 111-116; Apr. 1952, p. 153-154.

First part: Band sawing of light alloys. Second and third parts: Use of circular saws. Details of equipment and procedures shown by diagrams and illustrations. (G17, Al)

307-G. Comparative Research on Grinding Power and Economy of Abrasive Grinding Papers. (In German.) G. Pahlitzsch. *Metalloberfläche*, sec. A, v. 6, Apr. 1952. p. A53-A61.

Experimental investigation of different brands of grinding paper and cloth. Ways of increasing their useful life and method of computing grinding costs. Photographs, diagrams, graphs, and tables. (G18, L10)

308-G. Relationship of Rate of Flame Cutting on Shape of the Oxygen Nozzle. (In German.) L. A. Peletier and C. F. Belderbos. *Schweissen und Schneiden*, v. 4, Mar. 1952, p. 79-80.

Includes tabulated and charted test results. (G22, ST)

309-G. Determination of Power and Output of Planers and Machine Tools. (In German.) Otto Kienzle. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 94, Apr. 21, 1952, p. 299-305.

A simple process for indicating the cutting speed, cutting strength, moment of rotation, and capacity of these machines. Problems and solutions for such calculations. Graphs and diagrams. (G17)

310-G. The Negative Lubricating Action of Certain Liquid Media During Deep Drawing of Metals With Thinning of the Walls. (In Russian.) S. Ia. Veiler. *Doklady Akademii Nauk SSSR*, new ser., v. 83, Apr. 11, 1952, p. 709-712.

Drawing tests were made using various lubricants. Liquids such as CCl_4 were found to increase the tangential stresses and to increase the microhardness of the surface of the drawn parts. Data are tabulated and charted. (G4)

311-G. Cutting Forces During Rapid Cutting by Wide Cutters. (In Russian.) A. Ia. Lopata. *Stanki i Instrument,* v. 22, Dec. 1951, p. 23-25.

Dependence of cutting forces on cutting rate was determined for two steels (plain carbon and a Cr ball-bearing steel). Data are tabulated and charted. (G17, CN, AY, SG-c)

312-G. Dynamometer for Measuring Cutting Forces in Order to Determine Lathe Efficiency. (In Russian.) G. A. Levit. *Stanki i Instrument,* v. 22, Dec. 1951, p. 25-27.

Equipment and test results. (G17)

313-G. Circular Stretching. *Aircraft Production,* v. 14, June 1952, p. 198-199.

Use of an expanding segmental die for sizing gas-turbine stiffener rings of stainless steel. (G9, SS)

314-G. How to Reduce "Before and After" Welding Costs. Part I. Selecting Portable Air Grinders. *Industry & Welding,* v. 25, Apr. 1952, p. 48-50, 53.

(To be continued.) (G18)

315-G. Stainless Gutters Downspouts Easily Fabricated. *Iron Age,* v. 169, June 12, 1952, p. 126-127.

Fabrication from Type 430 Cr stainless steel. The operations include truing, shaping, seam pinching, rolling, cleaning, and soldering. Illustrated. (G general, K7, L12, SS)

316-G. Sheet-Metal Forming Without Vertical Press Movements. Gilbert C. Close. *Machinery* (American), v. 58, June 1952, p. 176-179.

New Douglas Aircraft process developed by O. A. Wheelon performed on a comparatively light press by use of an inflatable rubber bag. Diagrams and illustrations. (G1)

317-G. Unusual Die Pierces 726 Holes in Spinner Baskets. Joseph F. Howard. *Machinery* (American), v. 58, June 1952, p. 190-191.

Mass production of the automatic-washing-machine spinner basket at City Auto Stamping Co., Toledo, Ohio. (G2)

318-G. Direct Fluid Action Forms Sheet Metal. *Product Engineering,* v. 23, June 1952, p. 139.

See abstract of "Sheet-Metal Forming Without Vertical Press Movements", Gilbert C. Close, *Machinery* (American), item 316-G above. (G1)

319-G. Machining High Temperature Alloys. P. G. DeHuff and D. C. Goldberg. *Screw Machine Engineering,* v. 13, June 1952, p. 42-47.

See abstract of "Jet Alloys Toss Challenge to Machine Tools", *Steel,* item 234-G, 1952. (G17, SG-h)

320-G. Press Tools for the Tin-Box Industry. G. Taylor. *Sheet Metal Industries,* v. 29, June 1952, p. 503-508.

Designs are described and diagrammed. (To be continued.) (G1)

321-G. Tool Life Tests Faster. *Steel,* v. 130, June 16, 1952, p. 146.

Brief report on the use of radioactive-tracer testing methods at Cincinnati Milling Machine Co. (G17, S19)

322-G. (Book) **Sheet Metal Work.** Robert E. Smith. 76 pages. McKnight & McKnight, Market & Center Sts., Bloomington, Ill. $1.00.

Various kinds of sheet metal and adaptability of each to industrial needs. Instruction on fabricating these metals for their many everyday uses. Pictures and drawings. (G general)

323-G. (Book) **Zerspanbarkeit der Metallischen und Nichtmetallischen Werkstoffe.** (Machinability of Metallic and Nonmetallic Materials.) Karl Krekeler. 358 pages. 1951. Springer-Verlag, Berlin, Germany. 34.50 DM.

Materials and methods for machining industrial metals and nonmetals, based on both proved experimental data and industrial experience. Major sections are: materials for cutting and machining tools; testing for machinability; cutting and machining methods and tools; machinability of a wide variety of metals and nonmetallic materials; effect of coolants on machinability. (G17)

324-G. The Theory of Plasticity Applied to a Problem of Machining. *Journal of Applied Mechanics,* v. 19 (*Transactions of the American Society of Mechanical Engineers,* v. 74), June 1952, p. 234-239.

Discussion, including authors' reply, of above paper by E. H. Lee and B. W. Shaffer (Dec. 1951 issue; item 46-G, 1952.). Graphs and photomicrograph. 16 ref. (G17, Q23)

325-G. Oxy-Acetylene Processes. E. P. Auler. *Industry and Power,* v. 62, June 1952, p. 83-87.

Oxyacetylene processes for manufacture and assembly of steel pipe, fittings, and equipment into integral systems for conveying liquids and gases. (G22, ST)

326-G. Tools for the Impact Extrusion of Magnesium. *Machinery* (London), v. 80, June 5, 1952, p. 982-986.

See abstract of "Magnesium Impact Extruded", T. L. Patton, *Iron Age;* item 329-G, 1951. (G5, Mg)

327-G. Relative Workability of Representative Stainless Steels. *Materials & Methods,* v. 35, June 1952, p. 135.

Data sheet gives qualitative data on amenability of six types of stainless steel to annealing, blanking,

brazing, coining, deep drawing, embossing, hot and cold forming, grinding, hardening, machining, punching, polishing, flaring, upsetting, and welding.
(G general, J general, K general, L10, SS)

328-G. Fast Cutting of Metal by Better Mechanical and Metallurgical Engineering. *Metal Progress,* v. 67, June 1952, p. 94-96, 120, 122.

Summary of proceedings of panel discussion of machinability. Temperature effects; tool erosion by coolants; selection of carbide cutters and causes of their failure; microstructure vs. machinability; and "flame washing"—flame cleaning of castings. (G17, L10)

329-G. Wax Lubricants for Use in Production of Metal Stampings. *Modern Industrial Press,* v. 14, May 1952, p. 6, 8, 44.

Use of wax lubricants in the stamping industry. (G21)

330-G. Pressing, Trimming, and Welding a Liquid Nitrogen Sphere. Fred M. Burt. *Modern Industrial Press,* v. 14, May 1952, p. 46, 48.

Operations on high-pressure vessel used in supersonic rocket engines. Design, material, and construction processes.
(G1, G15, K1, T29)

331-G. Proper Cutting Fluids Can Step up Machining. R. F. Huber. *Steel,* v. 130, June 23, 1952, p. 72-76.

Factors considered include the metal, the cutter, the specific operation, and choice of the proper cutting oil or coolant. Chart of recommendations for various steels; also several nonferrous metals and alloys. Photographs. (G21)

332-G. New Stamping Process Developed at Douglas Aircraft. Thomas A. Dickinson. *Steel Processing,* v. 38, June 1952, p. 277-278, 279.

See abstract of "Sheet-Metal Forming Without Vertical Press Movements," Gilbert C. Close. *Machinery* (American), item 316-G, 1952. (G1)

333-G. Forces in Dry Surface Grinding. E. R. Marshall and M. C. Shaw. *Transactions of the American Society of Mechanical Engineers,* v. 74, Jan. 1952, p. 51-58; disc., p. 58-59.

Dynamometer for measuring independently normal and tangential forces in surface grinding. These forces are correlated with such variables as wheel speed, table speed, depth of cut, direction of table motion, grit material and size, specimen hardness, and dressing technique. X-ray diffraction methods are employed to study surface stresses and depth of cold work induced by grinding. (G18)

334-G. The Size Effect in Metal Cutting. W. R. Backer, E. R. Marshall, and M. C. Shaw. *Transactions of the American Society of Mechanical Engineers,* v. 74, Jan. 1952, p. 61-71; disc., p. 71-72.

A cutting process involving formation of very small chips at high cutting speeds (micromilling), was investigated, and results are applied to a study of the grinding operation. Shear energy involved in grinding is compared with that in turning, micromilling, and the tensile test. 10 ref. (G17)

335-G. Surface Temperatures in Grinding. J. O. Outwater and M. C. Shaw. *Transactions of the American Society of Mechanical Engineers,* v. 74, Jan. 1952, p. 73-81; disc., p. 81-86.

Heat-transfer theory involving a moving heat source is applied to the grinding process to obtain an equation for the mean surface temperature which predicts surface temperatures as high as 3000° F. for a representative fine-grinding operation. Representative values of mean temperature between the chip and grinding wheel obtained by the tool-work-thermocouple technique. Role of the grinding atmosphere in production of sparks and in determining energy involved in grinding. Existence of high surface temperatures in fine-grinding operations is demonstrated by presence of a transformed surface layer that is largely retained austenite. (G18)

336-G. Production Cutting and Flame-Hardening. Archer B. Jones. *Welding Journal,* v. 31, June 1952, p. 469-474.

Examples of cutting and flame hardening in the manufacture of mining machinery, material handling, and conveying equipment at Jeffrey Mfg. Co., Columbus, Ohio. (G22, J2, ST)

337-G. (German.) **Machining of Aluminum and Its Alloys.** K. Specht. *Aluminium,* v. 28, Apr. 1952, p. 112-115.

Tool forms and operating conditions for sawing, shaping, slotting, milling, etc. Diagrams and tables of machinability of the various alloys. (To be concluded.) (G17, A1)

338-G. Die Quenching Precision-Forms Tough Alloys. Joseph S. Corral and Lyle R. Boarts. *American Machinist,* v. 96, July 7, 1952, p. 125-129.

How 50-75% savings are being realized at North American Aviation in precision-forming high-strength Al alloys by a new manufacturing technique called form-die quenching. Straightening operations are eliminated and many "impossible"

jobs now can be formed to precise limits in a single press operation. (G1, Al)

339-G. Simple Zinc-Alloy Dies Speed Small Orders. J. A. Thompson. *American Machinist,* v. 96, July 7, 1952, p. 138-140.

Procedures and equipment of Short Order Dept., South-Wind Div., Stewart Warner Corp., for production of sample, experimental, spare, and emergency parts of stainless steel, sheet Al, Inconel, and other high-temperature alloys. (G3, Zn)

340-G. High Rake Angles Aid Milling Performance. Joe H. Crawford and M. Eugene Merchant. *American Machinist,* v. 96, July 7, 1952, p. 172-175.

Test results (shown graphically) indicate that high speed steel cutters give better performance by using rake angles of the order of 25-40°. Either a higher cutting speed for the same tool life, or a longer tool life for the same cutting speed, can be secured. Workpiece finish and accuracy are improved. (G17)

341-G. Titanium Tests at High Temperatures. *Automotive Industries,* v. 107, July 1, 1952, p. 74, 82, 84, 94.

Results of tests on cold forming plus annealing, hot forming, scale removal, and spot welding. A basic aim was to determine the adaptability of the machines and procedures used in forming stainless-steel components to the forming of Ti parts. (G general, K3, J23, Ti)

342-G. Tool Requirements of Tougher Alloys. *Aviation Age,* v. 17, June 1952, p. 6-15.

See abstract of "Jet Alloys Toss Challenge to Machine Tools", by P. G. DeHuff and D. C. Goldberg, *Steel;* item 234-G, 1952. (G17, SG-h)

343-G. The Effect of Diamond Wheel Grinding on the Surface Finish of Sintered Carbides. E. Dinglinger. *Engineers' Digest,* v. 13, June 1952, p. 189-193. (Translated and condensed from *Werkstattstechnik und Maschinenbau,* v. 42, Feb. 1952, p. 50-56.)

In order to reach sound conclusions from metal-cutting research, many variables, including tool angles, cutting speed and feeds, cooling, and heating must be taken into account. An additional variable which, if not controlled, can completely vitiate research results, is keenness and surface finish of the cutting tool. This was first established in machining tests on wood, plastics, and other similar materials; it was also found that the optimum finish was not necessarily the finest. It appears that various materials require varying grades of tool finish for most satisfactory machining. Data tabulated and charted. (G18, C-n)

344-G. Processes in Grinding Sintered Carbides. *Industrial Diamond Review,* new ser., v. 12, June 1952, p. 110. (Translated and condensed from article by J. Hinnüber and W. Hibbes, *Werkstattstechnik und Maschinenbau,* v. 41, Nov. 1951, p. 413-417.)

Recommended procedure using silicon or boron carbide, or diamond dust. (G18, C-n)

345-G. Continuous Filing is Economical. H. J. Chamberland. *Iron Age,* v. 169, June 26, 1952, p. 108-109.

Compares economy of band filing with that of hand or jig filing. Greatly improved accuracy and speed; also other advantages. (G17)

346-G. Spinning Techniques Solve Complex Problems of Forming. H. W. Snook. *Light Metal Age,* June 1952, p. 10-11, 22-23.

Procedures and equipment developed by El Segundo Div., Douglas Aircraft Co. (G13)

347-G. Titanium: Report on Cold Forming and General Machinability. James Joseph. *Machine and Tool Blue Book,* July 1952, p. 184-186, 188-190, 192-198, 200.

Conclusions based on work of North American Aviation, Los Angeles. Test results on a variety of operations. (G17, G general, Ti)

348-G. Hydroforming: A New Method of Deep Drawing Simple or Intricate Shapes. *Machine and Tool Blue Book,* July 1952, p. 249-250, 252, 254.

Equipment manufactured by Cincinnati Milling Machine Co. Mode of operation. (G8)

349-G. Some Features of the Impact Extrusion Process. L. Stockman. *Machinery Lloyd* (Overseas Ed.), v. 24, June 7, 1952, p. 96-98.

Manufacture at Impact Extrusions, Ltd., Feltham, Middlesex, England, of collapsible tubes from Sn, Pb, and Al. (G5, Sn, Pb, Al)

350-G. Mass Production of Structural Steel Products. Howard E. Jackson. *Modern Industrial Press,* v. 14, June 1952, p. 13-14, 16, 18, 22, 44, 46.

Production of structural-steel metal pot-supporting cradles at Pacific Car & Foundry Co., Seattle. Operations include acetylene torch cutting, press punching, and electric-arc welding. General plant equipment. (G2, G22, K1, CN)

351-G. Panel Discussion on Magnesium. *Modern Metals,* v. 8, June 1952, p. 69-70.

Drop-hammer forming, use of beads and depressions in deep drawing, and latest developments in hot lubrication. (G4, F22, Mg)

352-G. Machining Beryllium Copper. David Birch. *Screw Machine Engineering,* v. 13, July 1952, p. 49-51.

Special problems involved. Setups are diagrammed. (G17, Cu)

353-G. Flame Tools for Scrap Cutting. R. F. Helmkamp and A. H. Yoch. *Welding Engineer,* v. 37, July 1952, p. 26-29.

How scrap too big for the charging box is being cut down to size by hand-cutting torches, oxygen lances, or mechanized flame cutting. Table of machine-cutting data for steel of constant thicknesses. (G22, A8, ST)

354-G. Shot Peening Cuts Drill Pipe Failures. Ralph Irving. *World Oil,* v. 135, July 1, 1952. p. 109-110.

Shop tests indicate life of equipment is extended by four times. (G23, ST)

355-G. (German.) **Conditions of Forming in Hot Deep Drawing.** Dieter Lenz. *Archiv für das Eisenhüttenwesen,* v. 23, May-June 1952, p. 173-181.

Types of material used for hot deep drawing, tools and machinery needed, and various aspects of their production. Tables, charts, and macrographs. 17 ref. (G4)

356-G. (German.) **New Knowledge on Gas Cutting, and Its Application.** H. Kunz. *Schweissen und Schneiden,* v. 4, June 1952, p. 204-210.

Role of selection of a cutting gas, practical methods, and economic considerations. Diagrams and photographs. (G22)

357-G. (German.) **Machining Heavy Forgings in Germany.** Heinrich Dürr. *Stahl und Eisen,* v. 72, June 5, 1952, p. 687-695.

Survey of equipment and procedures. (G17, ST)

358-G. (Russian.) **The Influence of Thermal Deformation on the Precision of Metal-Cutting Machines.** V. E. Smirnov and D. N. Reshetov. *Stanki i Instrument,* v. 23, Jan. 1952, p. 5-12.

Mathematical theory. Experimental data are charted, tabulated, and discussed. (G17)

359-G. (Russian.) **Scientific Research Work of ENIMS in 1951.** A. A. Padogin. *Steklo i Keramika,* v. 23, Feb. 1952, p. 1-11.

Automatization and mechanization of machines and production processes; investigation of operating processes on machines (shaping, dynamics of cutting, investigation of new methods of machining); study and determination of means of increasing strength and durability of machine parts, precision and economy of production and use of machines; investigation and development of modern construction of units and mechanisms; creation of basic machines; and preparation of proposed specifications and machine-building standards. Tables and graphs. (G17)

360-G. Grinding Titanium. *Aircraft Production,* v. 14, July 1952, p. 238-239.

Interim results on research into grinding-wheels and techniques of grinding. (G18, Ti)

361-G. USAF Puts Its Money on "Big Squeeze". Irving Stone. *Aviation Week,* v. 57, July 7, 1952, p. 38, 40, 42, 46.

Air Force program on heavy presswork for more efficient aircraft production. Seventeen huge presses are to be made available to a series of companies during the next two years. (G1)

362-G. Cost Reduction Through Cold Extrusion. *Machine Design,* v. 24, July 1952, p. 150-151.

Cold extrusion of steel parts is shown to offer the designer many opportunities formerly only possible with nonferrous metals. Typical examples illustrated. (G5, ST)

363-G. Electromechanical Machining. Malcolm F. Judkins. *Machine Design,* v. 24, July 1952, p. 230, 232, 234, 236.

See abstract of "Electro-Mechanical Machining of Hard Materials." *Tool Engineer;* item 201-G, 1952. (G17, TS, C-n, SG-m)

364-G. Hot Forming Aluminum Alloys. M. P. Meinel. *Product Engineering,* v. 23, July 1952, p. 163-165.

Need for hot forming of high-strength Al alloys; its effects on formability and mechanical properties; and selection of heating procedure. (G general, Q general, Al)

365-G. A Practical Approach to the Theory of the "Neutral Line". L. H. Park. *Sheet Metal Industries,* v. 29, July 1952, p. 597-599, 606.

Results of tests on the behavior of material during forming, to ascertain effects of plastic deformation of the crystals of which the steel is composed. Table and diagrams. (G general, Q24, ST)

366-G. Questions and Answers on "Presswork and Its Problems." *Sheet Metal Industries,* v. 29, July 1952, p. 611-623.

A report of the first meeting of the Midlands Branch of the Sheet and Strip Metal Users Technical Association. Hardness tests; Cr plat-

ing of dies; deep drawing practice; Bonderizing; lubricants; various die problems; draw bead; experiences with 17% Cr steel; specific press problems; Kirksite cutting tools; material testing; and safety guards. (G1, Q29, L17, SS, Zn, Cr)

367-G. Spark Machining: Meets Superalloy Challenge. Paul Porterfield. *Steel,* v. 131, July 7, 1952, p. 92-93.

Refinement of equipment and techniques makes spark machining a versatile tool in the processing of hard-to-machine superalloys. (G17, SG-h, m, Ti, C-n)

368-G. Grinding, Brush Finishing Done on One Machine. *Steel,* v. 131, July 7, 1952, p. 94-95.

Technique making use of principles of centerless grinding. (G18, Ni)

369-G. Metal Cutting Temperatures and Tool Wear. Part I. A. O. Schmidt. *Tool Engineer,* v. 29, July 1952, p. 33-35.

Thermocouple technique used for metalcutting temperatures. Also use of temperature-indicating colors. Graphs show variations of temperature of the tool tip with rake angle and feed for SAE 1055 and a Mg alloy. Temperature distribution in a single-point tool was also determined. (To be continued.) (G17, S16, CN, Mg)

370-G. Rheem's New Hot Cupping and Cold Drawing Cuts Critical Steel in Artillery Parts. Fred J. Wood. *Western Metals,* v. 10, June 1952, p. 39-41.

New process is a combination and modification of two well-established industrial techniques—hot forging and cold drawing. Chief advantage is a 50% Mn savings in steel billets. (G4, ST)

371-G. (Book) **SAE Shot Peening Manual. 1952.** Society of Automotive Engineers, 29 W. 39th St., New York 18, N. Y. $1.50 to SAE members; $3.00 to non-members.

Prepared by 24 authorities. Shot-peening for designer, process engineer, and production man; what shot peening is and does; machines and materials used. Current practice in peening various types of parts. (G23)

372-G. (Book) **Protsess Obrazovaniia Poverkhnostogo Sloia pre Obrabotke Metallov Rezaniem.** (Process of Surface-Layer Formation During Machining of Metals.) A. I. Isaev. 358 pages. 1950. State Scientific-Technical Publishing House for Machine-Construction Literature, Moscow, U.S.S.R.

Results of research by the Section on Machining of the Central Scientific Research Institute of Technology and Machine Construction on the process of surface-layer formation during machining. Relations between the microgeometry of the machined surface and the shape of the cutting tool in the zone of chip formation. Methods for selection of conditions necessary for production of a machined surface of given finish, such as rate of cutting, shape of the tools, cutting fluids, etc. (G17)

373-G. How to Bend High-Strength Extruded Shapes. F. C. Hoffman. *American Machinist,* v. 96, July 21, 1952, p. 115-122.

New method developed at Lockheed Aircraft Corp. Jobs that formerly required 30 min. now can be done in 3. Accuracy within 5 min. of arc can be held consistently. Bending is performed in a specially designed fixture mounted in a standard hydraulic press. (G6)

374-G. Crush Grinding Makes Accurate Broaches. H. H. Gotberg. *Iron Age,* v. 170, July 17, 1952, p. 130-131.

How the latest crush-grinding techniques permit making quantities of small, intricate broaches with identical accuracy. (G18)

375-G. Titanium Sheetmetal Parts Successfully Made. Andrew N. Eshman. *Iron Age,* v. 170, July 17, 1952, p. 132-135.

Fabrication processes for Ti webs, channels, frames, shrouds, and angles at North American Aviation, Inc., Columbus, Ohio. Forming and drilling are emphasized. (G general, Ti)

376-G. Some Recent Concepts of Machinability. *Lubrication,* v. 38, July 1952, p. 81-96.

Fundamental processes involved in chip formation, tool life, role of cutting fluids in machining of metals, microstructure and machinability, application to cast iron, steels, high-temperature corrosion resistant alloys, and titanium. Tables, graphs, diagrams, and micrographs. (G17)

377-G. North American Forms and Quenches Wing Grids in Dies. Joseph S. Corral. *Machinery* (American), v. 58, July 1952, p. 158-163.

"Form-die quenching", as practiced at North American Aviation, Inc., Los Angeles. The wing grids are Al and the die members are made of Kirksite. (G1, J26, Al, Zn)

378-G. Unusual Manufacturing Methods Developed by Lockheed. *Machinery* (American), v. 58, July 1952, p. 164-171.

"Peen-forming" (shot-peening to put the curves into integrally-stiffened Al wing panel members); fab-

rication of integrally stiffened panels from tubular extrusions; and plastic tooling in forming operations. (G general, Al)

379-G. Convair Saves Money and Metal With Fiber-Glass Tooling. Charles O. Herb. *Machinery* (American), v. 58, July 1952, p. 172-177.

Use and production of fiber-glass tools at Consolidated Vultee Aircraft Corp., San Diego. (G general)

380-G. Metal Forming by the Spinning Process. R. H. Warring. *Machinery Lloyd* (Overseas ed.), v. 24, July 5, 1952, p. 81, 83-85.

Technique and scope; suitability of 22 materials for both shallow and deep spinning. Diagrams. (G13)

381-G. The Influence of Higher Rake Angles on Performance in Milling. Joe H. Crawford and M. Eugene Merchant. *Machinery* (London.), v. 81, July 10, 1952, p. 47-55.

A range of rake angles and cutting speeds was selected, and studies were made on cutter life and surface finish as a function of these variables. Effect of these variables on such quantities as forces, shear angle, chip friction, work done in cutting, and calculated temperature of the chip-tool interface. High speed steel cutters and hot rolled SAE 1020 stock were used. Photographs, graphs, and table. (G17, CN, TS)

382-G. Electric Spark "Machining". *Machinery* (London.), v. 81, July 10, 1952, p. 57-61.

Equipment manufactured by Sparcatron, Ltd., Gloucester, England, for piercing and "grinding" operations. Examples of use. Block and circuit diagrams and photographs. (G17, G18)

383-G. Hot Machining Methods for Difficult-to-Machine Metals. A. A. Caminada. *Materials & Methods;* v. 36, July 1952, p. 98-100.

Survey of latest techniques shows that hot machining can reduce tool wear, increase cutting speed, and improve surface finish. Tables list the advantages and disadvantages of hot vs. cold machining and a comparison of various heating methods. Graphs. 11 ref. (G17)

384-G. Cold Forming Stainless Steel Parts. Kenneth Rose. *Materials & Methods,* v. 36, July 1952, p. 101-116.

Various stainless steels, their formability properties, grades and applications for specific operations. Selection factors, cold forming properties and methods, tool and die materials, cleaning and finishing and annealing procedures. (G general, SS)

385-G. Cold Working Copper-Base Alloys. H. M. Miekk. *Metal Industry,* v. 81, July 4, 1952, p. 10-13.

Influence of the crystal structure of alpha brass on its cold working properties, stressing uniformity and average grain size. Recommends that additions of phosphorus to α-brass be avoided in the manufacture of brass sheet for deep drawing. (G4, Q24, Cu)

386-G. Electro-Spark Erosion. *Metal Industry,* v. 81, July 11, 1952, p. 31-33.

See abstract of "Electric Spark Machining", *Machinery* (London), item 382-G, 1952. (G17, G18)

387-G. Hot Bending Large Diameter Pipes on Site. *Welding and Metal Fabrication,* v. 20, July 1952, p. 246-247.

A plant in Kent, England, consists essentially of a sand-filling tower, a heating furnace, a bending table, and a bending capstan. (G6)

388-G. Heating With the Oxyacetylene Flame. Earl H. Frail. *Welding Journal,* v. 31 July 1952, p. 596-599.

Bending, straightening, and forming operations. Diagrams and illustrations. (G general)

389-G. (German.) Composition and Use of Cutting Oils. C. Becher. *Chemische Technik,* v. 4, Apr. 1952, p. 156-158.

Factors to be observed in the proper use of water-oil emulsions for cooling and lubrication in different kinds of machining operations. (G21)

390-G. How to Machine and Finish Stainless Steel. *American Machinist,* v. 96, Aug. 4, 1952, p. 111-126.

Basic rules governing tooling, machine operation, and cutting fluids. Specific operating tips for major metal-cutting operation. Latest ideas on finishing methods, including grinding, buffing, and polishing. Numerous tables, graphs, schematic drawings, and photographs. (G17, G18, L10, SS)

391-G. Machinability of Gray Iron by Constant Pressure Lathe Tests. Edward A. Loria. *Foundry,* v. 80, Aug. 1952, p. 194, 196, 198, 200.

Quantitative data on the machinability of various gray cast irons measured on the constant pressure lathe developed by Battelle Memorial Institute. (G17, CI)

392-G. New Press Pierces, Bends Boiler Parts. *Iron Age,* v. 170, July 31, 1952, p. 96-97.

An 8500-ton hydraulic press at the Barberton, Ohio, plant of Babcock & Wilcox Co. can double as a piercing and as a bending press. It is teamed with a 1200-ton hydraulic draw bench. (G2, G6, ST)

393-G. Big Automatic Machines Revolutionize Sheetmetal Operations. E. N. Laurance. *Iron Age,* v. 170, Aug. 7, 1952, p. 114-115.

Equipment of Glenn L. Martin Co., Baltimore. Fuselage and wing panels are produced on a 300-ton rising-bed-type Sheridan stretch-forming press. An all-hydraulic Hufford stretch-wrap forming machine features pushbutton automatic controls. Irregular contours and leading edges of parts for the Martin P5M-1 Marlin flying boat are being made on a Farnham forming roll. (G9)

394-G. Drilling Machines. Part 3. *Machine and Tool Blue Book,* v. 48, Aug. 1952, p. 243-244, 246, 248, 250, 252, 254.

Drilling stainless steels, Meehanite, graphitic steels, nitriding steels, hard materials, and armor plate. (G17, SS, CI, CN, SG-m)

395-G. Use of "Draw Clips" for Forming Sheet Metal Parts With Rubber Dies. J. A. Whittingham. *Machinery* (London), v. 80, July 17, 1952, p. 103-108.

Equipment and procedures used at the Columbus, Ohio, plant of North American Aviation, in production of wing ribs, stiffening channels, cowl formers, nose skins, and other Al aircraft parts. (G8, Al)

396-G. Friction Sawing at Solar Aircraft. Gilbert C. Close. *Modern Machine Shop,* v. 25, Aug. 1952, p. 136-140.

Experiments with toothless band saw blades point way to fast, economical method of cutting ferrous metals. (G17, Fe)

397-G. Unusual Tools and Machines for the Mass Production of Parts. C. W. Hinman. *Modern Machine Shop,* v. 25, Aug. 1952, p. 146-148, 150.

Rubber-pad dies for deep drawing and a method of bulging bowl-shaped shells. (G8, G4)

398-G. New Jaws Reduce Stretching Costs. Robert B. Stanton. *Modern Machine Shop,* v. 25, Aug. 1952, p. 206, 208, 210.

Less sheet stock material is required in stretch forming operation when swiveling-type jaws are used. (G9)

399-G. Hi-Jet System for Increasing Tool Life. R. J. S. Pigott and A. T. Colwell. *SAE Quarterly Transactions,* v. 6, July 1952, p. 547-566.

Improvements resulting from applying cutting liquids in fine forced jets. Compares results with those obtained by the flooding system. Adaptations of various recording instruments and other improvements developed during running of the tests. Practical applications of the Hi-Jet system. (G21, ST)

400-G. Springback: Problem in Metal Forming. Frederico Strasser. *Steel,* v. 131, Aug. 4, 1952, p. 90-91.

Springback is the property of any piece of metal which is bent or formed, either by hand, or by mechanical means, not to maintain completely the shape given to it by the tool, but to recover somewhat its original shape, or position, after the bending stress is released. Factors involved and methods for minimizing springback. Diagrams. (G general)

401-G. Etching Rolls by Airless Blasting. *Steel Equipment & Maintenance News,* v. 5, July 1952, p. 3.

Dressing temper mill rolls by airless blasting has proved very profitable at Weirton Steel Co., Weirton, W. Va. The process is being used primarily for etching rolls 8 or 9 in. in diam. for use in the temper rolling of strip prior to tin plating. (G23, ST)

402-G. Die Design for Metal Blanking. R. C. Berliner. *Steel Processing,* v. 38, July 1952, p. 329-332.

Three types of blanking dies: temporary or quick process type, permanent dies of the progressive type, and permanent dies of the compound type. Graphs. (G2)

403-G. Metal Cutting Temperatures and Tool Wear. Part II. (Concluded.) A. O. Schmidt. *Tool Engineer,* v. 29, Aug. 1952, p. 51-54.

Cratering effect observed at high cutting speeds caused by higher tool temperatures. Effects noted in carbide milling of SAE 1020, 1055, 3140, 4150, 4335, and NE 8745 steel. 11 ref. (G17, C-n, CN, AY)

404-G. Tool Forces and Tool-Chip Adhesion in the Machining of Nodular Cast Iron. K. J. Trigger, L. B. Zylstra, and B. T. Chao. *Transactions of the American Society of Mechanical Engineers,* v. 74, Aug. 1952, p. 1017-1025; disc., p. 1025-1027.

An investigation of the machining characteristics of nodular cast iron in both the as-cast and the annealed conditions. Tool forces, cutting temperatures, and tool-chip contact areas are compared for different grades of cemented-carbide tools. Tables, graphs, and photomicrographs. 16 ref. (G17, CI)

405-G. A Comparison of Parameters for the Machining of Gray Cast Iron. L. V. Colwell, H. J. Holmes, and F. B. Rote. *Transactions of the American Society of Mechanical Engineers,* v.

74, Aug. 1952, p. 1029-1037; disc., p. 1037-1038.

Compares several types of data on parameters for predicting cutting speeds of gray iron. A series of 11 irons, representing ranges of alloys, ferrite, graphite, and mechanical properties was used in the study. Cutting forces, power, and energy were determined from drilling and milling tests, and cutting speed vs. tool life lines were determined for each of the irons. Correlations were attempted between cutting speed for a 20-min. tool life, and other available information. Tables, graphs, and photomicrographs. (G17, CI)

406-G. Thermophysical Aspects of Metal Cutting. B. T. Chao, K. J. Trigger, and L. B. Zvlstra. *Transactions of the American Society of Mechanical Engineers,* v. 74, Aug. 1952, p. 1039-1049; disc., p. 1049-1054.

Some basic issues in the theory of metal cutting are analyzed. Effect of cutting speed and feed on the mechanism of chip formation in high-speed machining operations. A differential equation of the temperature field in the chip as well as that in the workpiece was set up, and the nature of the solution studied. The thermal number and its significance in metal cutting is illustrated and its limitations discussed. Graphs. 15 ref. (G17)

407-G. The Mechanics of Three-Dimensional Cutting Operations. M. C. Shaw, N. H. Cook, and P. A. Smith. *Transactions of the American Society of Mechanical Engineers,* v. 74, Aug. 1952, p. 1055-1064.

Chip-flow direction and the velocity and force relations for an oblique cutting tool are compared with experimental results. Analytical consequences of the observations. Method of applying the oblique-tool results to 3-dimensional tools is illustrated by three examples involving a lathe tool, a face-milling cutter, and a drill point. Diagrams, tables, and graphs. (G17)

408-G. The Rotary Cutting Tool. M. C. Shaw, P. A. Smith, and N. H. Cook. *Transactions of the American Society of Mechanical Engineers,* v. 74, Aug. 1952, p. 1065-1073; disc., p. 1073-1076.

An unusual lathe-type cutting tool takes the form of a disk that may be rotated about its central axis. Representative test data for both rotary and stationary tools. Schematic drawings, charts, and photographs. (G17)

409-G. Measuring the Cooling Properties of Cutting Fluids. G. M. Hain. *Transactions of the American Society of Mechanical Engineers,* v. 74, Aug. 1952, p. 1077-1079; disc., p. 1079-1082.

Simple technique for evaluating the heat transfer properties of fluids. Graphs. (G21)

410-G. The Big Squeeze. W. P. Brotherton. *Western Machinery and Steel World,* v. 43, July 1952, p. 80-82.

Presses used at Ryan Aeronautical Co., San Diego, for the production of high-temperature structures for jet engines. (G1, SS, ST, Al)

411-G. Temporary Dies Effect Saving of 90% on Limited Production and Experimental Work. Stanley Wochnik. *Western Metals,* v. 10, July 1952, p. 39-40.

How the above is possible using dies of cold rolled steel, brass, Al, stainless, Monel, and laminated material. (G1, T5, SS, ST, Ni, Cu, Al)

412-G. (French.) Importance of the Preparation of the Surface: Peening. Roger Marpon. *Métallurgie et la Construction Mécanique,* v. 84, June 1952, p. 463, 465.

The problems of preparing metallic surface before painting. Mechanical and chemical cleaning. Special attention is paid to peening; advantages over other mechanical methods. (G23, L10, L12)

413-G. (German.) Stamping of Aluminum. G. Oehler. *Aluminium,* v. 28, July-Aug. 1952, p. 238-245.

Equipment and procedures. Design of tools. Bending and deep drawing. Influence of drawing speed, jack pressure, and lubrication. Power requirements. (G3, G4, Al)

414-G. (Spanish.) Oxygen Cutting of Cast Iron, Stainless Steel, and Other Cast Alloys. I. Aversten and Chr. Scharfhausen. *Ciencia y Técnica de la Soldadura,* v. 1, July-Aug. 1951, 9 pages.

Difficulties encountered in oxygen cutting and the conditions under which it can be used for different materials. Compares changes in material subjected to ordinary oxygen cutting and to oxygen cutting with pulverized iron. Drawings and photographs. (G22, CI, SS)

415-G. (Spanish.) Oxygen Cutting With Powder. André Brizard. *Ciencia y Técnica de la Soldadura,* v. 1, Sept.-Oct. 1951, 8 pages.

Three oxygen-cutting processes using iron powder, chemical powder, and inert powder. Materials needed and possible applications. Schematic drawings and tables. (G22)

416-G. Jet Engine Combustion Chambers Made to Close Tolerances.

Automotive Industries, v. 107, Aug. 1, 1952. p. 40-41.

Production at Ryan Aeronautical Co., San Diego, of tubular chambers, involving punch presses and seam and spot welding. Outer chambers made of stainless steel and inner of Inconel. (G2, K3, SS, Ni)

417-G. Carbon Dioxide Coolant Lowers Tool Grinding Costs. John Kwolek. *Iron Age,* v. 170, Aug. 14, 1952, p. 124-125.

Extensive tests at Cadillac's Tank Plant show many advantages from use of CO_2 as a coolant in grinding carbide tools. Grinding can be done faster. Wheel life is longer. Life of tools ground is longer. Grinding is cleaner. There are no disposal, sanitation, or fire hazard problems. Surface finish is better. Materials handling is simplified. Cost is relatively high. (G21, C-n)

418-G. Central System Distributes CO_2 Coolant for Grinding. P. S. Cerne and C. O. Parrat. *Iron Age,* v. 170, Aug. 14, 1952, p. 126-128.

Extensive tests have sold Thompson Products, Inc., on use of CO_2 as a coolant in grinding carbide tools, carbide and high speed steel broaches. Experiments on other machining uses are being made. Thompson has installed a central storage tank from which a high-pressure pump feeds CO_2 through pipelines to points of use. (G21, C-n)

419-G. What You Should Know About Stretch Forming. E. V. Sharpnack. *Iron Age,* v. 170, Aug. 14, 1952, p. 138-140.

Advantages and disadvantages for production of Al parts. Recommendations for procedures and for selection of alloys. (G9, Al)

420-G. Spin-Draw Complex Metal Parts. *Iron Age,* v. 170, Aug. 15, 1952, p. 140.

Brief description applied to Al and alloys. Diagrams. (G13, Al)

421-G. Electro-Machining of Carbides and Other Hard Compacts. Arthur H. Allen. *Metal Progress,* v. 62, Aug. 1952, p. 87-89, 142.

Use of this process to reduce consumption of diamond bort. The electrolytic process, the electro-sparking process, the ultrasonic process, and combination processes. (G17)

422-G. Machinability: Theory Pays Off. R. K. Gould. *Steel,* v. 131, Aug. 18, 1952, p. 98-102.

Elementary review of theory. Basic principles and underlying laws governing the cutting and machining of metals are gradually being put to work to solve tough machining problems. (G17)

423-G. Torture Chambers for Jet Engines. *Welding Engineer,* v. 38, Aug. 1952, p. 38-39.

See abstract of "Jet Engine Combustion Chambers Made to Close Tolerances," *Automotive Industries;* item 416-G, 1952. (G2, K3, SS, Ni)

424-G. How to Cut Steel Sections. G. E. Kabacy. *Welding Journal,* v. 31, Aug. 1952, p. 705-707.

Oxyacetylene process. (G22, CN)

425-G. (Book) **Design and Use of Cutting Tools.** Leo J. St. Clair. 421 pages. 1952. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. $7.00.

How to select and use efficiently high speed steel, cast-alloy, and carbide cutting tools designed specifically to help machinists and tool engineers lower operating costs, eliminate waste, and produce better quality work. More than 50 tested ideas for increasing tool life and for achieving higher cutting speeds and feeds. Suggestions for strengthening cutting edges so as to prevent trouble on tough machining jobs. Performance advantages and disadvantages of each kind of tool. (G17, T6, TS, C-n)

426-G. (Book) **Schleif Industrie Kalender.** (Handbook of the Grinding Industry.) Ed. 25. 528 pages. 1952. Vulcan Verlag Dr. W. Classen, Wiessenstrasse 55, Essen, Germany. 14 DM.

Natural and synthetic grinding polishing agents; equipment. methods, and procedures for grinding metals, wood, and stone; physical properties and standards of grinding and polishing agents; trade names; other pertinent information. (G18)

427-G. Alloyed-Titanium Tooling. *Aero Digest,* v. 65, Aug. 1952, p. 17-19.

Headaches involved in fabrication of Ti alloys for production dies. Problems encountered in connection with drilling, stamping, and forming Ti alloys. (G general, Ti)

428-G. Electric-Spark Erosion. *Aircraft Production,* v. 14, June 1952, p. 271-274.

See abstract of "'Machining' Hard Metals by Electric Spark", *Engineering,* item 431-G, 1952. (G17)

429-G. The Effect of Shot Peening on Damage Caused by Cavitation. Nicholas Grossman. *ASTM Bulletin,* July 1952, p. 61-66.

Shot peening was found to reduce cavitation damage of two carbon steels and one brass. The amount of decrease varied from 7 to 58% for the different materials. Apparatus and procedure. Results are tabulated, charted, and illustrated. (G23, Q9, CN, Cu)

430-G. Ford Body Parts Made in Modernized Plant. Joseph Geschelin. *Automotive Industries,* v. 107, Aug. 15, 1952, p. 34-38.

Dearborn Stamping Plant. Forming and spot and seam welding equipment. (G3, G4, K3, CN)

431-G. "Machining" Hard Metals by Electric Spark. *Engineering,* v. 174, July 25, 1952, p. 121-122.

Equipment developed by British firm. Schematic diagrams and illustrations. (G17)

432-G. Four-Roll Plate-Bending Machine. *Engineering,* v. 174, Aug. 1, 1952, p. 140-141.

Equipment made by a British firm. (G6)

433-G. Cold-Rolled Fillets. R. J. Love. *Engineering,* v. 174, Aug. 8, 1952, p. 164.

A process devised for strengthening fillets, consisting of cold rolling with steel balls, has given striking results. It was used on cast crankshafts of flake-graphite iron. Fatigue test results show that, under reversed bending, cold rolling increased the limiting stress of crankshafts by 60% and that under "one-way" loading, the increase of strength was as much as 80%. Graphs and diagrams. (G23, Q7, ST)

434-G. Abrasive Belts Taper Aluminum Plate. *Iron Age,* v. 170, Aug. 21, 1952, p. 130-131.

Equipment for putting the taper and finish on Al plate for aircraft wings. It can remove as much as 0.01 in. of stock in one pass, over entire width of plates 72 in. wide. Roughing and finishing can be done in same machine. (G18, Al)

435-G. Babcock & Wilcox Installs New Forming Equipment. *Iron and Steel Engineer,* v. 29, Aug. 1952, p. 143, 145.

New vertical press and horizontal drawbench for producing hollow forgings and for bending heavy plate. Diagrams and illustrations. (G1, ST)

436-G. Forming, Polishing, and Machining Magnesium. *Materials & Methods,* v. 36, Aug. 1952, p. 133.

Tabular presentation of formabilities, tube-bending radii, procedure, tool materials for machining, and coolants for machining. (G general, L10, Mg)

437-G. Diversified Metalworking Behind Cleveland Trencher's Versatile Machines. Walter Rudolph. *Modern Industrial Press,* v. 14, Aug. 1952, p. 13-14, 16, 18, 22.

Picture story of equipment and procedures of Cleveland Trencher Co., Cleveland, Ohio, in production of mechanical trenching equipment. Includes flame cutting, press forming, riveting, welding, punching, and bending. (G general, K general, CN)

438-G. Manufacturing Specialized Steel Products. Howard E. Jackson. *Modern Industrial Press,* v. 14, Aug. 1952, p. 28, 30, 34, 36, 50.

Procedures and equipment of Hydraulic Supply Mfg. Co., Seattle, Wash., in making a diversified line of hydraulic mining equipment. Includes shearing, slotting, punching, and welding. (G general, CN)

439-G. An Automatic Machine Tool. William Pease. *Scientific American,* v. 187, Sept. 1952, p. 101-110, 112, 114-115.

A milling machine that converts information on punched tape into the contours of a finished part. Photographs and diagrams. (G17)

440-G. Refrigerator Production at Luton. *Welding and Metal Fabrication,* v. 20, Aug. 1952, p. 274-280.

Forming, gas welding, spot welding, and finishing procedures and equipment of British firm. (G general, K2, K3, L general)

441-G. Torture Chambers. W. P. Brotherton. *Western Machinery and Steel World,* v. 43, Aug. 1952, p. 82-84.

Production of jet-engine combustion chambers at Ryan Aeronautical Co., San Diego. Outer chambers are of stainless steel and inner of Inconel. Operations include pressing, piercing, tube forming, and seam and spot welding. Photographs. (G general, F26, K3, Ni, SS)

442-G. New Rod Converts Welding Machine Into Cutting Tool. Arthur L. Phillips. *World Oil,* v. 135, Aug. 1952, p. 260, 262.

How two new flux-coated electrodes enable a welder to use his welding machine for cutting and burning all kinds of metals—even cast iron. Heat generated by the welding machine is concentrated in a small area by the flux on the rod. At the same time the flux generates a gas shield which prevents oxidation of the cut. (G22)

443-G. New Stretch-Forming Techniques. Frank Charity. *American Machinist,* v. 96, Sept. 1, 1952, p. 113-115.

Method by which North American Aviation, Inc., produces larger unit parts, and minimizes trimming scrap by using stretch-forming techniques with soft, annealed, or half-hard sheet Al. (G9, Al)

444-G. How to Select a Cutting Fluid. *American Machinist,* v. 96, Sept. 1, 1952, p. 118-120.

Properties of cutting fluids may be varied by altering their composition so they are useful for a large

number of applications. Considerations of tap water, tap water + anti-corrosive additives, high and low oil content emulsions, and weights of oils. (G21)

445-G. Don't Overlook Operator Safety in Press-Tool Design. L. A. Faulkner. *American Machinist,* v. 96, Sept. 1, 1952, p. 121-134.

Safety practices by means of good design and barriers in primary and secondary operations. Diagrams and photographs. (G1)

446-G. Correlation of Machinability With Inclusion Characteristics in Resulphurized Bessemer Steels. Lawrence H. Van Vlack. *American Society for Metals,* Preprint 16, 1952, 13 pages.

Some of the factors affecting shapes and sizes of inclusions in rolled resulfurized steels. These inclusion characteristics are governed by Si and S contents of the steel, mechanical working which the steel receives, and possibly by O_2 content of the sulfide phase. These characteristics, in turn, influence machinability of the steels when other metallurgical factors are equal. (G17, M28, CN)

447-G. The Influence of Insoluble Phases on the Machinability of Titanium. R. M. Goldhoff, H. L. Shaw, C. M. Craighead, and R. I. Jaffee. *American Society for Metals,* Preprint 30, 1952, 25 pages.

Machinability of Ti is shown to be very sensitive to strength level and to machining conditions. It doubles when purity is increased from that of the commercial Mg-reduced grade to that of the high-purity iodide Ti. Similarly, when the tool-thrust load is increased or speed of cutting is decreased, machinability increases relative to free-cutting steel much more than does, say, 18-8 stainless steel. In an attempt to improve the machinability of Ti, alloy additions that formed insoluble phases with Ti were investigated. Some, like B, As, Te, S, and Se, made a moderate improvement in machinability when added in suitable amounts. Others, particularly carbon, were very detrimental to machinability. (G17, Ti)

448-G. Shop Practice: Forming, Machining, and Joining. C. Ridgely Kemp. *Engineer Research and Development Laboratories,* (Ft. Belvoir, Va.), "The Magnesium Symposium", Feb. 9, 1951, p. 59-64.

For Mg and its alloys. (G general, K general, Mg)

449-G. Band-Sawing Nonferrous Castings. H. J. Chamberland. *Foundry,* v. 80, Sept. 1952, p. 112-113, 220.

Types of saws and rates of cutting for castings of Al, Mg, and Cu. (G17, Al, Mg, Cu)

450-G. Machining Tungsten Carbide With Diamond Tools. G. B. Dauncey and R. S. Young. *Industrial Diamond Review,* new ser., v. 12, Aug. 1952, p. 161-164.

Turning and boring sintered carbide using a production model lathe with shaped and polished diamond-tipped lathe tools. (G17, W, C-n)

451-G. Hot Cupping, Cold Drawing Replace Machining Operations. G. F. Burnley. *Iron Age,* v. 170, Sept. 4, 1952, p. 152-153.

Savings in critical alloy steel and elimination of costly machining operations resulted from use of hot cupping and cold drawing to make 81-mm. shells from SAE 1010 steel billets at Rheem Mfg. Co., Richmond, Calif. Billets are induction heated at 2000° F. and hot forged in a 600-ton Ajax forging press. (G4, CN)

452-G. Radioactive Tools Permit Fast Tool Wear Studies. M. E. Merchant, Hans Ernst, and E. J. Krabacher. *Iron Age,* v. 170, Sept. 4, 1952, p. 154-155.

New method for speeding up machinability studies and other tests depending on measurement of tool wear by use of radioactivity. (G17, TS)

453-G. Radioactive Cutting Tools for Rapid Tool Life Testing. M. Eugene Merchant, Hans Ernst, and E. J. Krabacher. *Machine and Tool Blue Book,* v. 48, Sept. 1952, p. 236-240, 242.

See abstract of "Radioactive Tracers for Rapid Measurement of Cutting Tool Life," *Journal of Applied Physics,* item 105-G, 1952. (G17, S19, C-n)

454-G. More Production Through Better Understanding of Machinability. K. R. Blake. *Modern Machine Shop,* v. 25, Sept. 1952, p. 158-160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182-183, 186.

Velocity and area of contact, effect of tool shape, mechanism of failure in tool life, high speed steel tools, carbide tools, effect of cutting fluids, and work-tool thermocouple tests. Diagrams. (G17, T6, C-n, ST)

455-G. Titanium: It Can Be Formed and Drawn. Carter C. Higgins. *Steel,* v. 131, Sept. 8, 1952, p. 92-93.

Brief discussion. (G4, Ti)

456-G. The Design of Small Punches for Stamping. Federico Strasser. *Steel Processing,* v. 38, Aug. 1952, p. 382-384.

Information about standard and special design of small punches, as well as a few practical suggestions about how to solve problems which arise. Numerous diagrams. (G3)

457-G. Metal Removal by Oxygen Processes. E. M. Holub. *Steel Processing,* v. 38, Aug. 1952, p. 388-390.

The oxygen-cutting processes for removing metal, and other newer developments in this field. (G22)

458-G. (French.) Saving of Material by the Use of a Device Fitted to Machine-Tools. A. Fortier. 4th International Mechanical Engineering Congress, June 1952, 6 pages.

An automatic gage, Etamic, fitted to the machine tool for eliminating mass-produced parts which are outside the specified tolerance. The device can be easily adapted to all machine tools and is said to solve the reject problem. Diagram. (G17, S14)

459-G. The Stamping Property of Steel Material. E. M. H. Lips, W. de Vos, and H. v. Zuilen. 4th International Mechanical Engineering Congress, June 1952, 7 pages.

Life of a stamping tool in relation to quality of stamped material. Method for testing quality and experimental data for stampings made from phosphor bronze and from silicon iron. Theory. Tables and diagrams. (G3, Cu, Fe)

460-G. Testing of the Cutting Property of Materials for Mass Production. P. Wiest. 4th International Mechanical Engineering Congress, June 1952, 11 pages.

Machinability tests and a new quick method in which the material to be tested is machined by longitudinal turning with cutting speed increased in stages by permanent amounts from a certain initial speed up to failure of the cutting edge. Tabular data on machinability of carbon and alloy steels using 5% tungsten steel tools and high speed tools. Derived relative machinability indexes for these steels (including American types). Diagrams, graphs, and photomicrographs. (G17, CN, AY)

461-G. Spherical Joint; Rubber Forming of Stainless-Steel Tubes. *Aircraft Production,* v. 14, Sept. 1952, p. 297.

Forming method used by Accles and Pollock, Ltd., Oldbury, Birmingham. (G8, SS)

462-G. Men of "Parts" Watch Machines Work at Sylvania. E. J. Tangerman and George H. DeGroat. *American Machinist,* v. 96, Sept. 15, 1952, p. 113-136.

Editors visited three Sylvania Electric Products plants, two in Warren, Pa., and one in Emporium, Pa. Ideas in wire plating, drawing, and welding; annealing; steel-sheet carbonizing and slitting; pin rolling; plastics molding; assembly; and metal parts manufacture. (G general, F28, J general)

463-G. Soft Steel and Ultrasonics Machine Carbide. George H. DeGroat. *American Machinist,* v. 96, Sept. 15, 1952, p. 141-144.

Hard and brittle metals, as well as nonmetals, are quickly and easily machined using the ultrasonic process. Soft tools, with boron carbide as an abrasive, drill and thread holes, produce complex cavities and recesses of any depth and shape in carbides, hardened tool-steel, ceramics, glass, and other materials, conducting and nonconducting alike. (G17, C-n, TS)

464-G. Make Research Data Useful to the Shop Man. Max Kronenberg. *American Machinist,* v. 96, Sept. 15, 1952, p. 145-150.

Productivity in metal-cutting operations. Use of available charts for SAE 1035 steel and for brass, illustrated by numerical examples. Points out need for similar research to be done on many other materials. (G17)

465-G. Cartridge Cases Are Drawn From Hot-Forged Cups. George H. DeGroat. *American Machinist,* v. 96, Sept. 15, 1952, p. 151-152.

Operation as applied by Frankford Arsenal to production of 75-mm. cases from SAE 1030 hot rolled steel bar stock. Only three basic operations are required—sawing bar stock, heating bars, and forging. Important advantages. (G4, CN)

466-G. Labor Is the Big Factor in Friction-Sawing Costs. *American Machinist,* v. 96, Sept. 15, 1952, p. 153.

A recent item described use of ordinary box strapping as a toothless band-blade for friction-sawing stainless steels and other ferrous alloys. However, although box strapping costs only 3 cents per shift as compared with $12 per shift for regular saw blades, labor costs make actual costs four to six times higher for the makeshift material. (G17, Fe, SS)

467-G. Soviet Machine Tools. J. Mannin. *Engineers Digest,* v. 13, Aug. 1952, p. 253-256.

History of machine tools in Russia, equipment produced in Russia, features and design, technical advancement in techniques and mechanical equipment, and statistical review of production and use of machine tools and allied equipment. (To be continued.) (G17)

468-G. Cutting Fluids for Machine Tools. C. M. Larson. *Petroleum Engi-*

neer, v. 24, Sept. 1952, p. C5-C8, C10, C13-C14, C16, C18.

Cooling, wetting properties, lubrication, chip removal, types of fluids, cutting oils, and cutting fluid ingredients. Cutting fluid recommendations for high speed steel, cobalt alloys, and cemented carbide tools. Photographs and tables. (G21, TS, Co, C-n, SG-j)

469-G. Plastic Dies Draw Truck Panels. H. C. Tuttle. *Steel,* v. 131, Sept. 15, 1952, p. 92-93.

Application of a standard aircraft-parts procedure to drawing operation at Chrysler Corp.'s Detroit plant. Advantages are time-saving, lighter weight, and lower cost. (G4, CN)

470-G. (German.) **Fundamentals of the Effect of Temperature and Abrasion in Machining, Especially of Creep Resisting and Stainless Steels.** H. Opitz. 4th International Mechanical Engineering Congress, June 1952, 8 pages.

The processes involved in continuous formation of shavings from point of view of plasticity mechanics. Proposes a method for the calculation of temperature accompanying shearing process. The special problems of C steels and austenitic steels. Graphs and diagrams. (G17, SS, CN, AY, SG-h)

471-G. Definitions, Functions, Types, and Designations of Cutting Fluids. O. W. Boston. *American Society of Mechanical Engineers,* Paper 52-SA-13, 1951, 3 pages.

ASTM and ASME Committee approved standard of cutting fluid terminology developed in hope of being acceptable to both oil chemists and production men. (G21)

472-G. Time Saving Method for Tapering Aircraft Skins. *Automotive Industries,* v. 107, Sept. 15, 1952, p. 74.

Method developed by the Carborundum Co., Niagara Falls, N. Y., and the Bell Aircraft Corp., Buffalo, N. Y. A wide-belt machine is used on which cuts up to 0.1 in. deep can be taken over the entire width of Al sheets up to 72 in. Machine can also be used in polishing. (G18, L10, Al)

473-G. Flexible Cutting-Off Wheels. C. A. J. Timms. *Foundry Trade Journal,* v. 93, Sept. 4, 1952, p. 265-266; disc., p. 266-268.

Removal of runners, gates, and risers in the nonferrous dressing shop. Available methods and particularly the newly developed flexible cutting-off wheels. (G18, E24, EG-a)

474-G. Plastic Prototypes, Perspective Drawings Speed New Product Production. W. G. Patton. *Iron Age,* v. 170, Sept. 18, 1952, p. 155-158.

How Creative Industries, Detroit, uses above two methods to help production executives and shopmen more readily visualize new part production problems. Plastic prototypes are rapidly made from inexpensive wooden models. This cuts costs by minimizing later design and tooling changes. Photographs and drawings. (G general)

475-G. Wide Face Grinding Wheels Boost Cylinder Sleeve Output. J. C. O'Rourke. *Iron Age,* v. 170, Sept. 18, 1952, p. 159.

A Cincinnati Milling Machine No. 3 centerless grinder was modified to use a wheel of 15-in. face. Sleeves are made of alloy cast iron at International Harvester Co., Melrose Park, Ill. (G18, CI)

476-G. Carbide Tool Cuts Cost for Threading Hardened Studs. *Iron Age,* v. 170, Sept. 18, 1952, p. 163.

Single-point carbide tools are used in an English Cri-Dan lathe on steel heat treated to Rockwell C-28-34. (G17, C-n, ST)

477-G. Mammoth Hydraulic Press and Draw-Bench Simplify Steam Boiler Production. *Machinery* (American), v. 59, Sept. 1952, p. 192-195.

See abstract of "Babcock & Wilcox Installs New Forming Equipment"; *Steel;* item 435-G, 1952. (G1, F22, ST)

478-G. Low Cost Blanking Dies for Light Gage Aircraft Parts. G. V. Rutkoskie. *Automotive Industries,* v. 107, Oct. 1, 1952, p. 66-68.

Technique by which rubber or cork strippers are employed for expelling blanked part; Kirksite is used in place of steel for die material. (G2)

479-G. Forming and Drawing Heavy Stampings for IHC Crawler Tractor. James C. O'Rourke. *Automotive Industries,* v. 107, Oct. 1, 1952, p. 70-71.

Equipment and procedures. (G4, ST)

480-G. Cup-Drawing From a Flat Blank: Part I. Experimental Investigation. Part II. Analytical Investigation. S. Y. Chung and H. W. Swift. *Institution of Mechanical Engineers, Proceedings,* (Applied Mechanics Div.), v. 165, W.E.P. 68, 1951, p. 199-223; disc., p. 224-228.

Part I: An experimental investigation of forces, work and strains involved, and conditions for successful drawing of a cylindrical shell from a flat circular blank. Most of

work was carried out on a low-carbon rimming steel, but comparative tests were made with Al, brass, and Cu of different tempers. Part II: An analysis of stresses and strains in the region of true drawing, taking into consideration effects of bending, thickness changes, strain hardening, blank-holding force, die-profile friction, and tool geometry, but not of anisotropy in material. Theoretical punch load-travel diagrams, process work, maximum punch loads and strains are compared with recorded experimental results over a wide range of tool design, operating conditions, and materials. Diagrams and graphs. 26 ref. (G4, Q24, ST, Al, Cu)

481-G. Friction Sawing. *Iron Age,* v. 170, Sept. 25, 1952, p. 148-149.

High-speed cutting method which softens metals first, then cuts. (G17)

482-G. Reliance, Manufacturer of V-S Drives, Points to Own Press Installation. Walter Rudolph. *Modern Industrial Press,* v. 14, Sept. 1952, p. 13-14, 16, 18, 22.

Description and numerous photographs of presses and press-related equipment of Reliance Electric & Engineering Co. (G1)

483-G. Press Tools for the Tin-Box Industry. (Concluded.) G. Taylor. *Sheet Metal Industries,* v. 29, Sept. 1952, p. 822-824.

Irregular dies and their construction. Diagrams. (G1)

484-G. Centrifugally Cast Jet Engine Rings: How to Rough Machine Them. Frank Meninger. *Steel,* v. 131, Oct. 6, 1952, p. 78-79.

Tools to remove crust on castings made of Cr, Cr-Ni-Mo, and Cr-Ni-Mo-W alloy. Tabulated information on cast alloys, tool-grind data, and operating data.
(G17, Cr, Ni, Mo, W)

485-G. Forming Copper Prior to Assembly. Parts I. and II. L. Bernhardt. *Welding and Metal Fabrication,* v. 20, Aug. 1952, p. 281-285; 1952, p. 316-320.

Some mechanical and physical properties of Cu and its alloys, particularly in sheet, strip, and plate forms. Suitability and choice of various forming and joining processes, including examples from various industries. Heat treatment is described. Part II: Bending, folding, and seaming. Types of welding were gas, arc, resistance, and pressure. Diagrams and photographs.
(G general, K general, Cu)

486-G. Report of an Investigation of the Strain Hardening Effect Upon Subsequent Levels Due to Metal Cutting. C. L. Sonnenschein and W. P. Wallace. *American Society of Mechanical Engineers,* Paper 52-SA-25, 1952, 5 pages.

Experimental results of increase of hardness of SAE 1020 steel as a function of depth of cut for a given cutting speed, from which an analytical expression of form $H = CD^{II}$ may be written. Attempts were made to correlate resulting hardness with finish and chip type produced. Hardness measurements were made with 15-N Rockwell tester and verified by use of X-ray diffraction techniques. (G17, Q29, CN)

487-G. The Significance of the Thermal Number in Metal Machining. B. T. Chao and K. J. Trigger. *Engineer's Digest,* v. 13, Sept. 1952, p. 311-313. (Condensed from Paper 52-SA-58, *American Society of Mechanical Engineers,* June 15-19, 1952).

Theoretical analysis of heat flow in conjunction with cutting data in high-speed orthogonal metal machining operations. An explanation is offered for difference in chip curvature as cutting conditions are changed. Further significance of thermal number in metal machining. Diagrams and graphs. (G17)

488-G. Hydroforming Facilitates Drawing of an Intricate Jet-Engine Part. Joseph H. Lareau. *Machinery* (American), v. 59, Oct. 1952, p. 206-209.

New method of manufacturing a fuel nozzle swirl-cup which makes use of hydroforming process. Advantages of this method are better quality, fewer operations, and lower-cost tooling. (G8)

489-G. Recommended Procedures for Fabricating Aluminum Parts. Joseph de Feher. *Refrigerating Engineering,* v. 60, Oct. 1952, p. 1078-1080, 1118-1120.

Drilling and boring, tapping and threading, reaming, spinning, sawing, blanking, punching, and other sheet metal operations; riveting, forging, upsetting, and embossing, bending aluminum pipes, soldering, brazing, welding, and causes of welding rejects.
(G general, F22, K general, Al)

490-G. Engineering on Call. Gilbert P. Muir. *Tool Engineer,* v. 29, Oct. 1952, p. 65-70.

How Westinghouse offers centralized manufacturing engineering assistance to its manufacturing divisions; in particular, metals forming and joining departments.
(G general, K general)

491-G. Better Cutting on Stainless Steels. *Welding Engineer,* v. 37, Oct. 1952, p. 64-66.

Includes iron-rich powder cutting, chemical flux cutting, and arc-oxygen cutting. (G22, SS)

492-G. (Book.) Drills and Drilling Practice. Ed. 2. R. A. Schater. 62 pages. National Automatic Tool Co., Richmond, Ind. $1.00.

Drills and drilling all kinds of material. Engineering data and tables for reference purposes. (G17)

493-G. (Book.) Machining Alcoa Aluminum. 72 pages. 1952. Aluminum Co. of America, Pittsburgh, Pa.

Tool characteristics for machining Al and its alloys; speeds, feeds and depths of cuts; where common practice as well as tools of standard design may be used; and use of special practices or tools for better results. (G17, Al)

494-G. The Shear Angle Relationship in Metal Cutting. M. C. Shaw, N. H. Cook, and I. Finnie. *American Society of Mechanical Engineers,* Paper 52-SA-51, Apr. 28, 1952, 20 pages.

Several analytical solutions for shear angle in metal cutting. Underlying assumptions are critically discussed. Diagrams. 17 ref. (G17)

495-G. Metal Removal by Oxygen Processes. E. H. Holub. *Blast Furnace and Steel Plant,* v. 40, Oct. 1952, p. 1197-1199.

Cutting, lancing, gouging, scarfing, deseaming or desurfacing, processes for removing defective surface metal, and flame washing or flame finishing, a manual process for removal of metal from surfaces in varying amounts with a high degree of control. The powder process is being used increasingly on stainless steels, cast iron, and some nonferrous material. Equipment and procedures. (G22, ST, CI)

496-G. Soviet Machine Tools. (Concluded.) J. Mannin. *Engineers' Digest,* v. 13. Sept. 1952, p. 309-310, 316.

Review of recent advances and current developments in the Russian machine tool industry. (G17)

497-G. The Plastic Forming of Metals. *Fortune,* v. 66, Nov. 1952, p. 138-141, 218, 222, 224.

Three processes (forming by drawing, cold extrusion, and hot extrusion) used to form various metals to closely finished shapes, thus saving machining, materials, and man hours. (G4, G5)

498-G. How Water Soluble Oils Affect Carbide Milling Cutter Life. J. R. Roubik. *Iron Age,* v. 170, Oct. 23, 1952, p. 112-115.

Carbide face milling tool-life tests on four medium-carbon steels at Brinell hardnesses of 200, 300, and 400 which show that use of H_2O-soluble oil emulsions as a cutting fluid has no value in prolonging tool life. Steels used in tests were SAE 3140, 4340, 4145, and 4145 sulfurized. (G21, C-n, AY)

499-G. How Structure Influences the Machinability of Thin Gray Iron Castings. Edward A. Loria. *Materials & Methods,* v. 35. Feb. 1952, p. 99-100.

Practical test results show that inoculating iron with silicon carbide improves surface machinability of thin sections. Graphs. (G17, CI)

500-G. Eyelet Machine Products Versus Screw Machine Products. Walter E. Allan. *Product Engineering,* v. 23, Nov. 1952, p. 181-183.

Merits of both methods for forming small parts from Armco iron, brass, SAF 1010 steel, stainless steel, Zn, Cu, bronze, Ni, and Al. Diagrams. (G4, Fe, CN, SS, Zn, Cu, Ni, Al)

501-G. On the Problem of Lubricity in the Machining and Working of Metals. E. Kadmer. *Third World Petroleum Congress. Proceedings.* sec. VII, 1951, p. 343-353; disc., p. 353-354.

Object was to adduce examples of metal machining and metal working processes which show that it is both possible and necessary to test suitability of lubricants for these applications, and to provide numerical data concerning these lubricants. Includes chemical surface treatments. (G21, F1, L14)

502-G. Effect of Certain Impurities on Free Cutting Brass. Grayson B. Wood, Jr. *Wire and Wire Products,* v. 27, Oct. 1952, p. 1027-1029, 1128-1130.

Results of tests to determine effect of impurities of Fe, Al, and to lesser extent, Pb, Sn, and Sb, on operations of machining, drawing, and annealing. (G17, G4, J23, Cu)

503-G. (German.) Free Bending of Sheet-Metal. K. H. Wolter. VDI Forschungsheft 435, Supplement to *Forschung auf dem Gebiete des Ingenieurwesens,* ser. B, v. 18, no. 3, 1952, 32 pages.

Earlier research and theories on bending are refined to obtain proper relations between bending forces, bending lines, and plate curvatures in the case of free bending. Results show that free bending is superior

to conventional bending by means of dies. Numerous graphs and diagrams. 35 ref. (G6)

504-G. (German.) **Boron Carbide as Lapping Abrasive in Precision Finishing.** W. Uhlmann. *Metall,* v. 6, Sept. 1952, p. 530-534.

Application to the finishing of various machine parts. Diagrams and micrographs. (G19, C-n)

505-G. (German.) **Deformation of Clips and Rim Zones of Workpieces During Turning.** Walter Leyensetter. *Stahl und Eisen,* v. 72, Sept. 11, 1952, p. 1139-1144; disc., p. 1149.

Method of measuring the deformation and results of its determination on two plain carbon and one low-alloy steel, in dependence on cutting rate. Deformation of the rim zones of longitudinal and transverse polished sections after machining at cutting rates of 30-140 meters per min. Graphs and micrographs. (G17, CN, AY)

506-G. (German.) **The Machinability of Plain Carbon Steels in Fine Turning.** Gustav Wagner. *Stahl und Eisen,* v. 72, Sept. 11, 1952, p. 1144-1149.

Tests using the "tool life—tool path" method using high speed steel tools on rimmed and killed free-machining steels, case hardening, structural, and toolsteels having carbon contents of 0.02-0.76%. A relative characteristic value for machinability of plain carbon and alloy steels is deduced. Data are compared with those for American steels and with those obtained using conventional cutting speeds. (G17, CN)

507-G. (German.) **Deep Drawing of Large Sheet-Metal Parts.** Heinrich L. Hilbert. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, Sept. 1, 1952, p. 817-823.

Experiences in the field of automobile body-parts production. Tools, materials, and costs; reasons for defects. Diagrams and photographs. (G4, CN)

508-G. (German.) **Establishing of the Surface Quality in Turning From the Weight of Shavings.** W. Leyensetter. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, Sept. 1, 1952, p. 825-828.

Experimental details on a new method. Data are tabulated and charted. (G17)

509-G. How to Machine Stainless Steel With Carbides. Jos. J. Robert. *American Machinist,* v. 96, Oct. 27, 1952, p. 109-112.

Recommendations for the various types of stainless steels. Data on tool angles, carbide grades, speeds, and feeds are drawn from successful applications to a broad range of jobs. (G17, SS)

510-G. What Constituents Affect Machinability of Gray Irons? E. A. Loria, F. W. Boulger, and H. L. Shaw. *American Machinist,* v. 96, Oct. 27, 1952, p. 122-124.

Effect of composition, multiple correlation analysis, and effect of combined carbon. Graphs and tables. (G17, CI)

511-G. Drawing and Welding Two-Piece Fenders. Herbert Chase. *Automotive Industries,* v. 107, Nov. 1, 1952, p. 68-71.

Process in use by Ford Co. Spot and arc welding techniques are used. (G4, K1, K3, CN)

512-G. New Lubricant Improves Die Life, and Finish. W. E. Curtiss. *Iron Age,* v. 170, Oct. 30, 1952, p. 94-95.

In drawing a 6.5-in. deep, 3-in. diam. shell from 0.065 annealed blanks of 1010 steel considerable difficulty was encountered in fourth and final draw. Hard Cr plated dies had extremely short life and pick-up on dies caused scuffing and scratches on shells. Use of Metalloid X-60 as a die lubricant increased number of pieces per dressing from 1000 to 11,800 with same dies. Improved surface finish and increased output were achieved with no changes in setup, feeds, speeds, and lubrication methods. (G21, CN)

513-G. Special Steel Piercing Methods Appraised. A. Williman and W. P. Wallace. *Iron Age,* v. 170, Oct. 30, 1952, p. 96-98.

Bullet and jet charges were used to pierce high-Mn steel oil well casings and low-carbon SAE-1020 steel plates. Measurement of residual stress was made by X-ray diffraction techniques. Diagrams and micrographs. (G2, Q25, AY, CN)

514-G. Bearing Races Machined at High Speed. Roger Brooks. *Iron Age,* v. 170, Nov. 6, 1952, p. 180-182.

High-velocity machining of alloy steels such as SAE 52100 and 4620. Cutting speed was raised from 200-275 to cover 600 surface ft. per min. on an automatic lathe. Greater horsepower was required, tools were increased to the largest practical cross section, carbide cutting tool bits were used and chip breakers were redesigned. (G17, AY, C-n)

515-G. The Machining of High Temperature Alloys. *Aero Digest,* v. 65, Nov. 1952, p. 92-100.

Problems involved. Table gives nominal physical and machining properties of three forms of Ti, two stainless steels, and four high-temperature alloys. (G17, Q general, Ti, SS, SG-h)

516-G. How to Grind Titanium. Leo P. Tarasov. *American Machinist,* v. 96, Nov. 1952, p. 135-146.

Grinding fluids, wheel specifications, rates of cut, titanium variables, surface finish, and abrasive recommendations. Tables, graphs, and photographs. (G18, Ti)

517-G. Investment Castings Need Not Be "Free-Machining" Stainless. *American Machinist,* v. 96, Nov. 1952, p. 147-150.

Machinability tests conducted under controlled conditions showed that differences in machinability of the various grades of stainless are of far less importance than castability. Tables and graphs. (G17, E15, SS)

518-G. Electrolytic Grinding. L. H. Metzger and George Keeleric. *American Machinist,* v. 96, Nov. 10, 1952, p. 154-158.

What it is, how it is done, how wheels are made, and how to convert carbide-tool grinders to electrolytic grinders. The process is based on anodic dissolution of the work on the same principle as electropickling and electropolishing. (G18, L13)

519-G. Britain, Too, Has Electro-Spark Machining. M. G. Seed. *American Machinist,* v. 96, Nov. 1952, p. 159-160.
(G17)

520-G. New Developments in Cutting Metal. R. J. S. Pigott. *American Soicety of Mechanical Engineers,* Paper 52-SA-55, 1952, 11 pages.

Factors affecting tool life. (G17, TS, C-n)

521-G. The Effect of Shot Peening on the Fatigue Life of Steel. A. G. H. Coombs. *Engineering,* v. 174, Oct. 24, 1952, p. 545-546; Oct. 31, 1952, p. 580-581.

Experimental procedures and results of investigation of a spring steel containing 0.77% C, 0.12% Si, 0.67% Mn, 0.045% S, 0.037% P, 0.28% Ni, and 0.22% Cn. Diagrams, graphs, and macrographs. (G23, Q7, CN)

522-G. Diamond Prepared Copper Wheels, Their Manufacture and Application. W. Peter. *Industrial Diamond Review,* new ser., v. 12, Oct. 1952, p. 220-224.

Abrasive wheels with diamond particles rolled into the copper surface. Graphs, diagrams, and photomicrographs. (G18, T5, Cu)

523-G. Electronics Applied to Machining Hard Metals. *Journal of Metals,* v. 4, Aug. 1952, p. 822-824.

Equipment and process used by Sparcatron, Ltd., England, which embodies the Rudorff and other patents. Advantages. Diagram and illustrations. (G17, SG-m)

524-G. (Book) Aluminum Forming. 151 pages. Reynolds Metals Co., 2500 S. 3rd St., Louisville, Ky.

Metallurgical and technical data pertaining to sheet and plate, types of sheet-forming operations, data on tubing and pipe, and forming, bending, and swaging of tubing and pipe. (G general, Al)

SECTION H

POWDER METALLURGY

1-H. The Manufacture of Cemented Tungsten Carbide. B. E. Berry. *International Chemical Engineering & Process Industries,* v. 32, Nov. 1951, p. 533-537.

Reprinted from *Murex Limited Review,* item 54-H, 1951.
(H general, W, C-n)

2-H. Sintered Aluminum of High Heat Resistance. (In French.) Roland Irmann. *Revue de l'Aluminium,* v. 28, July-Aug. 1951, p. 269-275; Sept. 1951, p. 311-316.

Various processes for obtaining pure Al powders and sintering them. Constitution, shape, and oxide content of the powders. Mechanical and physical properties are tabulated and charted. Structures of the powders. Applications. (H general, Al)

3-H. Stainless Steel Powder for Mechanical Parts. Arthur H. Grobe and Raymond Hoffman. *Product Engineering,* v. 22, Dec. 1951, p. 168-172.

Type 316 powder can be pressed and sintered at pressures and temperatures which are commercially feasible. Mechanical properties of the finished parts. Applications.
(H14, H15, Q general, T7, SS)

4-H. Refractory Bodies Composed of Boron and Titanium Carbides Bonded With Metals. James A. Nelson, Tracy A. Willmore, and Raymond C. Womeldorph. *Journal of the Electrochemical Society,* v. 98, Dec. 1951, p. 465-473.

Mixtures of various carbides in finely divided form were compacted with Ni, Fe, Co, Ti, or Cr and fired in an argon atmosphere at temperatures between 1925 and 2065° C. Reactions occurring between the carbides and metals. Compositions showing the greatest promise for further work. Strength properties are tabulated.
(H14, Q23, C-n, B, Ti, Co, Cr, Fe, Ni)

5-H. Developments in the Technique of Manufacturing Cemented-Carbide Alloys. (In German.) Carl Ballhausen. *Stahl und Eisen,* v. 71, Oct. 11, 1951, p. 1090-1097.

Development of electric furnaces for production of cemented carbides, especially the carbon-tube furnace. Developments in mixing, crushing, grinding, screening, drying, shaping, and sintering. Equipment.
(H12, H14, H15, C-n)

6-H. The Properties of Sintered-Iron Parts as Related to the Types of Powders Used and Their Processing Conditions. (In German.) *Stahl und Eisen,* v. 71, Oct. 11, 1951, p. 1103-1114.

Comprehensive correlated summary of such properties as corner strength, shrinkage, surface conditions, oxygen content, chemical purity, compressibility, mechanical properties, densities of various Fe powders. Compacting and sintering processes and mechanical properties of the sintered parts. 22 ref.
(H11, H14, H15, Fe)

7-H. Powder Metal Locking Part Is Bent 4 Deg. and Assembled Under Stress to Gain Spring Action. A. L. Fabens. *Precision Metal Molding,* v. 9, Dec. 1951, p. 29, 31-32.

The part is basically of Fe-Cu composition. It is unique in that it requires properties generally considered to be the least satisfactory characteristic of molded powder parts. (H general, Fe, Cu)

8-H. Stress Resistance and Low Cost Are Built Into This Food Disposal Unit by Die Casting, Powder Metallurgy, Permanent Mold Casting. *Precision Metal Molding,* v. 9, Dec. 1951, p. 38-40.

Production of various parts of a food disposal unit. Choice of materials is dictated by service requirements and the method of fabricating by economy. They include iron

powder impregnated with Cu, Ni bronze, and Zn.
(H general, E12, E13, T10, Fe, Cu, Zn)

9-H. For Wearing Qualities or Just Plain Cost Reduction, Appleton Depends Upon a Combination of PMM Processes. *Precision Metal Molding,* v. 9, Dec. 1951, p. 43-44, 75-77.

Die casting, powder-metal-part production, and plaster mold casting of bronze, Zn, Fe-Cu powder mixtures, and Al parts in the production of a spot light.
(H general, E13, E16, T10, Zn, Fe, Cu, Al)

10-H. Utilizing Impurities in Metal Powders. H. W. Greenwood. *Metal Industry,* v. 79, Nov. 30, 1951, p. 455-456.

Importance of minor percentages of elements on properties of the base metal. Further areas of research in this field. (H11)

11-H. Some Observations on the Role of the Binder in Cemented Refractory Alloys. J. T. Norton. *Powder Metallurgy Bulletin,* v. 6, Dec. 1951, p. 75-78.

Advantages and disadvantages of a solid homogeneous block of tungsten carbide as compared to tungsten carbide cemented with Co. Favors the heterogeneous combination, and lists criteria for a satisfactory binder material. (H12, W, Co, C-n)

12-H. Steel Parts by Hot Coining. J. P. Scanlan. *Powder Metallurgy Bulletin,* v. 6, Dec. 1951, p. 78-80.

Coining as a method of increasing the density of parts made from powdered steel alloys. Table gives mechanical properties and density of three hot-coined alloy steels.
(H14, P10, Q general, AY)

13-H. Infiltration Metallurgy. Claus G. Goetzel. *Research,* v. 4, Dec. 1951, p. 555-561.

Variations in techniques of production. Mechanical and physical properties of some powder combinations as well as applications. Data are graphed.
(H16, Q general, P general)

14-H. Hot Pressing Silver Powder. K. Ogawa and G. Matsumura. *Journal of Metals,* v. 4, Jan. 1952, p. 28-29.

Change of the aggregated state of Ag powders at various temperatures, and temperature range in which the effect of hot pressing is most marked. The compressibility of powder under low pressures at different temperatures was measured, and from these experiments, three degrees of change of the aggregated state at each temperature were observed. Results are graphed and tabulated. 10 ref. (H14, Ag)

15-H. Magnetic Parts by Powder Metallurgy. W. J. Polydoroff. *Electrical Manufacturing,* v. 49, Jan. 1952, p. 97-99, 228-230, 232, 234, 236, 238, 240, 242.

Properties of sintered compacts for d.c. applications, and the beneficial effect of alloy additions tending to produce increased density. Iron powder was the principal material involved. Quasi-laminated material offers promise for a.c. service. (H general, P16, Fe, SG-n, p)

16-H. Iron Powder: a Non-Allocated Metal. Philip R. Kalischer. *Precision Metal Molding,* v. 10, Jan. 1952, p. 23-25, 54-55.

Availability and probable military uses. Parts that can be made from iron powder.
(H general, T general, Fe)

17-H. Bronze Cams and Iron Followers in Matched Sets by Powder Metallurgy. *Precision Metal Molding,* v. 10, Jan. 1952, p. 35, 37-40.

Methods used in production of the parts for brake-control valves. The cams are made of sintered bronze and the follower of sintered iron. Dissimilar metals were chosen for wear and bearing properties.
(H general, T5, Fe, Cu)

18-H. The Manufacture of Cemented Tungsten Carbide Dies. B. E. Berry. *Wire Industry,* v. 19, Jan. 1952, p. 45-46, 49-52, 55.

See abstract from *Murex Limited Review;* item 54-H, 1951.
(H general, W, C-n)

19-H. Investigation of Sintered Aluminum. (In German.) Edith Boneisch and Wilhelm Wiederholt. *Zeitschrift für Metallkunde,* v. 42, Nov. 1951, p. 344-348.

"SAP", a new sintered Al material produced in a research laboratory in Germany, contains 88.8% metallic Al, 10.5% Al_2O_3, and small percentages of Si, Fe, Ti, and Cu. Chemical, physical, mechanical, and structural characteristics, and corrosion resistance. Tables, charts, and micrographs. (H general, R general, Al)

20-H. The Production and Properties of Oxide-Reduced Copper Powder. C. Ellwood and W. A. Weddle. *Journal of the Institute of Metals,* v. 80, Jan. 1952, p. 193-206.

A study of some of the principal variables in the oxidation of Cu wire, the comminution of the oxide so produced and its subsequent reduction to metallic copper powder. The properties of the powder and the effect on the final sintered product of variables in the production of the oxide and in subsequent pressing and sintering. 13 ref. (H10, H11, Cu)

21-H. Unrelated Simultaneous Interdiffusion and Sintering in Copper-

Nickel Compacts. J. M. Butler and T. P. Hoar. *Journal of the Institute of Metals,* v. 80, Jan. 1952, p. 207-212.

The progress of interdiffusion in Cu-Ni compacts was followed by metallographic examination of these compacts stained with the vapor from aqueous ammonium polysulfide. Results of the experiments show that, although metallic interdiffusion and sintering can and do occur simultaneously, the two phenomena are not causally related, and also that interdiffusion can, in the early stages of heat treatment, produce porosity and cause expansions that are the reverse of sintering. Micrographs. 24 ref.
(H15, N1, Cu, Ni)

22-H. Sizing Powder Particles. *Metal Industry,* v. 80, Jan. 4, 1952, p. 9-10.

The Photosedimentometer designed to put subsieve analysis on a routine basis. It is a particle-size comparator for maintaining consistency of powdered materials. (H11)

23-H. Powder Metallurgy 1925-1950-19?? A. J. Langhammer. *Metal Progress,* v. 61, Jan. 1952, p. 72-75.

A review indicating future trends. (H general)

24-H. The Adhesion of Powders and Its Use in the Determination of Particle Sizes. (In German.) E. Cremer, F. Conrad, and Th. Kraus. *Angewandte Chemie,* v. 64, Jan. 7, 1952, p. 10-11.

Magnesite, dolomite, Fe powder, and Mo powder were tested. Base materials were glass, magnesite, Ni, or Mo. Useful relationships applicable in particle-size determination were discovered. Data are charted and tabulated. (H11, Fe, Mo, Ni)

25-H. Crystal Size Distribution of Electrolytic Metal Powders; Powders From Fused Electrolyte Baths. Chuk-Ching Ma. *Industrial and Engineering Chemistry,* v. 44, Feb. 1952, p. 342-346.

A study was made of the effect of bath temperature and current density upon the size and size distribution of metal crystals produced electrolytically from fused salt baths. Results of experiments on Cb, Ta, and W powders. Two generalized rules were established: The higher the bath temperature, the coarser will be the metal crystals. The higher the current density, the finer will be the metal crystals.
(H10, H11, Cb, Ta, W)

26-H. Explosive Characteristics of Titanium, Zirconium, Thorium, Uranium and Their Hydrides. Irving Hartmann, John Nagy, and Murray Jacobson. *U. S. Bureau of Mines,* Report of Investigations 4835, 16 pages, Dec. 1951.

Results of experiments on 22 samples of Ti, Zr, Th, U, powders, and their hydrides. Data are graphed and tabulated. 16 ref.
(H11, Ti, Zi, Th, U)

27-H. (Book) **Powder Metallurgy.** 159 pages. British Information Services. 30 Rockefeller Plaza, New York. $4.25.

Research information on production and properties of sintered metals and alloys. Among the materials considered are 28 commercial Fe powders, sintered Fe-Cu compacts, Cu-Al alloys and Ti. Studies of surface energies of various metals and binary alloys, powder densities, and strength and hardness of sintered metals and alloys are included.
(H general, Fe, Cu, Al, Ti)

28-H. Heat Resisting Sintered Aluminum. R. Irmann. *Engineers' Digest,* v. 13, Jan. 1952, p. 9-12.

Previously abstracted from *Revue de l'Aluminium.* See item 2-H, 1952.
(H general, Al)

29-H. Powder Metallurgy Produces a Brass Ordnance Component; the Full Case History of an Important Piece. John Dale. *Precision Metal Molding,* v. 10, Feb. 1952, p. 34-36, 69-72.

Problems and techniques used in the production of brass rotors. Micrographs. (H general, Cu)

30-H. Design Data for Low Density Iron Powder Parts. *Precision Metal Molding,* v. 10, Feb. 1952, p. 43-44, 77-79.

Methods of making iron compacts. Mechanical properties of sintered Fe compacts. (H general, Q general, Fe)

31-H. Powder Metallurgy's Contribution to High-Temperature Materials. H. W. Greenwood. *Metal Treatment and Drop Forging,* Feb. 1952, p. 75-80.

Development of powdered metals and their application during recent years. Research necessary for future development in certain promising fields. (H general, T general)

32-H. Powdered Metals for Hotter Jets. *Business Week,* Mar. 1, 1952, p. 94-96.

How turbine wheels for jet engines can be fabricated through powder metallurgy.
(H general, T25, SG-h)

33-H. Mechanical Precision of Parts Obtained by the Powder Metallurgy Process. R. Girshig. *Microtechnic,* (English Ed.), v. 5, Nov.-Dec. 1951, p. 345-350; disc., p. 351-352. (Translated from the French.)

An evaluation of the process with a review of briquetting, sintering, and sizing. (H general)

34-H. Synthesis of Two Copper Tellurides by Compression of Crystalline Copper and Tellurium Powders. (In French.) Raymond Hocart and Roger Molé. *Comptes Rendus hebdomadaires*

des Séances de l'Académie des Sciences, v. 234, Jan. 2, 1952, p. 111-113.

By means of uni-axial compression at 3500-17,500 kg. per sq. cm., two crystalline phases were obtained; in each case a weissite-type phase, and in some cases a ricardite-type phase. (H14, M26, Cu, Te)

35-H. Powder Metallurgy. (In German.) **Part I. The Present Technical and Economic Status of Powder Metallurgy.** R. Keiffer. **Part II. The Scientific Fundamentals of Powder Metallurgy.** G. F. Hüttig. *Angewandte Chemie*, v. 64, Jan. 21, 1952, p. 41-54.

Includes numerous graphs, tables, and illustrations. 84 ref. (H general)

36-H. Physical Characteristics of Fine-Grained Crystalline Bodies in Connection With Reactions in Their Mixtures. (In Russian.) A. N. Ginstling. *Zhurnal Prikladnoi Khimii*, v. 24, June 1951, p. 566-575.

A study was made of solid-state reactions. One of the basic factors determining reaction rates of powdered nonmetallic mixtures is the area of contact between the particles. Emphasis is on nonmetallic compounds but metallic materials are also mentioned. Data are tabulated. 15 ref. (H11, P13)

37-H. Powder Metallurgy; a Review of the Literature and Recent Russian Work. *Chemical Age*, v. 66, Mar. 1, 1952, p. 345-347.

(H general)

38-H. Electrodeposition of Metal Powders; the Significance of Diffusion Processes at the Cathode. (In German.) *Helvetica Chimica Acta*, v. 35, Feb. 1, 1952, p. 363-374.

Reviews the problem on the basis of the literature. The role of current density, transition time, and conditions existing when vertical electrodes are used. 90 ref. (H10)

39-H. Continuous Quality Control in Hard-Metal Production. (In German.) H. Franssen. *Metall*, v. 6, Jan. 1952, p. 12-21.

A review and tabulation on the basis of the literature, organizing the data according to composition of the materials, which include ceramics, carbides, refractory metals, graphite, ceramic-metal compositions (cermets), etc. Production methods (including powder metallurgy); test methods; and mechanical, physical, and chemical properties. 49 ref.

(H general, C-n, SG-m)

40-H. Technique of Hot Pressing of Metal Carbides; A Semi-Automatic Hot Press. (In German.) J. Rietveld. *Metall*, v. 6, Feb. 1952, p. 81-82.

Effects of various factors on the process; equipment required. (H14, C-n)

41-H. Magnetic Observation of the Diffusion During Sintering of a Nickel-Copper Alloy. (In German.) Werner Köster and Josef Raffelsieper. *Zeitschrift für Metallkunde*, v. 42, Dec. 1951, p. 387-391.

Investigated by means of a magnetic method of analysis. Details of the experiments, such as establishment of sintering isotherms and observation of activation energy. Data are charted. (H15, N1, Ni, Cu)

42-H. The Sintering of Tungsten Carbide Plus Cobalt Cermets as a Surface Reaction. (In German.) Walther Dawihl. *Zeitschrift für Metallkunde*, v. 43, Jan. 1952, p. 20-22.

Investigations concerning the difference in the effect of Co, Ni, and Fe as auxiliary metals on the sintering of tungsten carbide. Reasons for the superior effect of Co in comparison with Ni; the inferiority of Fe. Data are tabulated. (H15, Co, W, C-n)

43-H. Some Properties of Engineering Iron Powders. C. J. Leadbeater, L. Northcott and F. Hargreaves. "Powder Metallurgy", His Majesty's Stationery Office (London), 1951, p. 33-74.

Previously abstracted from *Iron & Steel Institute*, Special Report 38, 1947. See item 5b-11, 1948. (H11, P general, Q general, Fe)

44-H. Production of Iron Powder by Electrodeposition. G. E. Gardam. "Powder Metallurgy", His Majesty's Stationery Office (London), 1951, p. 75-84.

Previously abstracted from *Iron and Steel Institute*, Special Report 38, 1947. See item 5b-10, 1948. (H10, Fe)

45-H. German Sintered Iron Bearings. L. Northcott and C. J. Leadbeater. "Powder Metallurgy", His Majesty's Stationery Office (London), 1951, p. 85-90.

Specimens of ferrous bearings and of some associated material from a German ¾-track vehicle were examined and features of design observed. Composition, physical, and mechanical properties were determined.

(H general, P general, Q general, Fe)

46-H. Trials of Sintered Iron Driving Bands for 20-Mm Oerlikon Ammunition. L. Northcott and B. D. Burns. "Powder Metallurgy", His Majesty's Stationery Office (London), 1951, p. 91-102.

Preparation of rings under different conditions of compacting pres-

sures and sintering temperatures; determination of mechanical properties, density and microstructure; and banding and firing trials to determine the functioning of the bands in the 20-mm. Oerlikon gun. Comparative tests were made with bands incorporating paraffin wax. Powder used was reduced FeO_2 (mill scale) type. Further developments include determination of influence of sintered iron bands on gun wear.
(H general, Q general, P10, M27, Fe)

47-H. Sintered Iron-Copper Compacts. L. Northcott and C. J. Leadbeater. "Powder Metallurgy", His Majesty's Stationery Office (London), 1951. p. 103-117.

Previously abstracted from *Iron and Steel Institute,* Special Report 38, 1947. See item 5C-16, 1948.
(H15, Q general, Fe, Cu)

48-H. An Aluminium Alloy Made by Powder Metallurgy. R. L. Bickerdike. "Powder Metallurgy", His Majesty's Stationery Office (London), 1951, p. 119-128.

Previously abstracted from *Iron and Steel Institute,* Special Report 38, 1947. See item 5d-1, 1948.
(H general, P10, Q27, Q29, Al, Cu)

49-H. Notes on German Developments in Non-Carbide Powder Metallurgy (1939-1945). C. J. Leadbeater. "Powder Metallurgy", His Majesty's Stationery Office (London), 1951, p. 129-151.

Previously abstracted from *Iron and Steel Institute,* Special Report 38, 1947. See item 5a-23, 1948.
(H general, Fe, ST, Cu, Mo, Al)

50-H. The Synthesis, Fabrication, and Properties of Beryllium Carbide. John H. Coobs and Walter J. Koshuba. *Journal of the Electrochemical Society,* v. 99, Mar. 1952, p. 115-120.

Methods that have been used in synthesizing beryllium carbide. Physical and chemical properties. Physical properties of fabricated beryllium carbide-base bodies, and the effects of graphite or beryllium oxide additives on properties of the bodies are disclosed.
(H general, Be, C-n)

51-H. The Sintering of Copper-Zinc Powder Compacts. D. D. Howat, R. L. Craik, and J. P. Cranston. *Journal of the Institute of Metals,* v. 80, Mar. 1952, p. 353-361.

Data obtained by differential thermal analysis, together with changes in volume and in electrical resistivity, may be taken as criteria of the sintering and alloying processes occurring when compacts of Cu and Zn powders are heated. Effects of particle size and compacting pressure on the mechanism were also investigated. (H15, H11, Cu, Zn)

52-H. Biaxial Pressing of Powdered Materials. (In Russian.) I. A. Leskovich. *Izvestiia Akademii Nauk SSSR,* Section of Technical Sciences, Aug. 1951, p. 1230-1233.

The distribution of stresses in metallic and nonmetallic powder compacts in relation to composition and shape factors. Experimental data are charted for some organic and inorganic compounds. (H14)

53-H. The Manufacture of Tungsten Powder and Ferro-Silicon at the Works of the Broken Hill Pty. Company Limited, New Castle. I. H. Carne. *Australasian Institute of Mining and Metallurgy, Proceedings,* new ser., Mar. 31-June 30, 1947, p. 1-14.

Manufacture, properties and applications. (H general, W, Fe-n)

54-H. Sintered Titanium Carbide. Frank W. Glaser and W. Ivanick. *Journal of Metals,* v. 4, Apr. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 387-390.

A pressure-sintering method was used to produce binder-free and very dense TiC specimens. Some physical and mechanical properties of these TiC bodies were determined and found to compare favorably with those of certain cemented TiC grades. The hot transverse rupture strength of TiC bodies remained substantially the same regardless of the amount or type of binder material used.
(H15, P general, Q general, Ti, C-n)

55-H. (Book) **Powder Metallurgy.** 159 pages. 1951. His Majesty's Stationery Office, London W.C.2, England. (Selected Government Research Reports, v. 9).

Consists of ten reports (some published previously in *Iron and Steel Institute,* Special Report 38, 1947.) Each report is separately abstracted.
(H general)

56-H. (Book) **Treatise on Powder Metallurgy. Vol. III.** Claus G. Goetzel. 899 pages. 1952. Interscience Publishers, Inc., 250 Fifth Ave., New York 1, N. Y. $22.00.

A classified, annotated, and indexed bibliography of 6330 items, both literature references and patents. (H general)

57-H. Five Ways to Make Iron Powder. B. T. duPont and Robert Fulton. *Iron Age,* v. 169, Apr. 24, 1952, p. 135-139.

Full-scale and pilot-plant production processes at Plastic Metals Div., National Radiator Co., Johns-

town, Pa. In the electrolytic process, high-purity Fe powder is obtained from steel plates. A rotary kiln, saggers, and a continuous-belt furnace all turn out sponge iron of different types. Scrap is still another source of Fe powder being melted, atomized, pulverized, and decarburized. Tabular data on properties. (H10, Fe)

58-H. Novel Methods Used to Form Molybdenum. G. L. Miller. *Iron Age,* v. 169, Apr. 17, 1952, p. 122-124.

Methods used in the production of ceramic products, and techniques used in making hard metal dies from tungsten carbide-cobalt powder have recently been successfully adapted for use in fabricating Mo metal. (H general, Mo)

59-H. A Directory of the Powder Metallurgy Industry. *Precision Metal Molding,* v. 10, Apr. 1952, p. 53-55, 57-60, 62-64, 66, 68-69, 71-74, 76.

A listing of components fabricators, powder producers, and equipment builders. (H general, A10)

60-H. Precision in Metal Powder Parts Is Not Limited to Dimension. Erle I. Shobert, II. *Precision Metal Molding,* v. 10, Apr. 1952, p. 36-37, 114.

Suggests a broader conception of precision for powdered metal components. Some essential properties of materials in the molding operation, such as electrical, magnetic, and mechanical properties, must be considered in addition to sizes and tolerances, densities, time under pressure, and die design. (H11)

61-H. New-Type Powdered Metal Bearing With Built-In Oil Reservoir. *Precision Metal Molding,* v. 10, Apr. 1952, p. 35, 101.

Bearings are made with porous Fe core and high-density surface. For high speed applications a bronze bearing face is applied. (H general, T7, Fe, Cu)

62-H. High Density Iron Powder Parts. Philip R. Kalischer. *Precision Metal Molding,* v. 10, Apr. 1952, p. 32-34, 99-100.

Properties, method of manufacture, applications, and design of compacts. Photomicrographs. (H general, Fe)

63-H. Friction Properties of Powdered Bronze Give New Saw Safety Device. *Precision Metal Molding,* v. 10, Apr. 1952, p. 31.

A "kick-proof" clutch used in portable circular saws by the Porter-Cable Machine Co., Syracuse. (H11, Q9, T6, Cu)

64-H. Characteristics of Core Materials Produced by Powder Metallurgy. *Precision Metal Molding,* v. 10, Apr. 1952, p. 38, 40.

For high-frequency electronic applications. Covers carbonyl iron powders, especially, and ferrites. Tables and graphs. (H10, Fe)

65-H. The Plus and Minus of Making Your Own Metal Powder Parts. Joseph L. Bonanno. *Materials & Methods,* v. 35, Apr. 1952, p. 101-105. (H general)

66-H. Industrial Applications of Semi-Conductors. 2. Silicon Carbide Resistors. R. W. Sillars. *Research,* v. 5, Apr. 1952, p. 169-175.

Manufacture and uses of resistors and general properties of Si carbide. (H general, T1, Si, C-n)

67-H. Role of Gases in the Production of High Density Powder Compacts. *Journal of Metals,* v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 540.

Discussion of paper by Donald Warren and J. F. Libsch. See item 83-H, 1951. (H11, H14, H15, Fe, Co)

68-H. Powder Metallurgy of Zirconium. *Journal of Metals,* v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 510-511.

Discussion of paper by Henry H. Housner, Herbert S. Kalish, and Roswell P. Angier; item 66-H, 1951. (H14, H15, Zr)

69-H. Sintered Aluminium of High-Temperature Strength. (In German.) R. Irmann. *Aluminium,* v. 27, Oct. 1951, p. 29-36.

See abstract from *Revue de l'Aluminium,* July-Aug., 1951, Sept. 1951. (In French.) See item 2-H, 1952. (H general, Al)

70-H. Magnetic Observation of Diffusion During Sintering of a Nickel-Zinc Alloy. (In German.) Werner Köster and Josef Raffelsieper. *Zeitschrift für Metallkunde,* v. 43, Feb. 1952, p. 37-39.

Method consisting of recording and analysis of magnetization curves. Results are indicated for some Ni-base alloys containing Zn. (H15, N1, Zn)

71-H. Determination of Particle Size in the Submicron Range. Y. Schubert and B. Kopelman. *Powder Metallurgy Bulletin,* v. 6, Apr. 1952, p. 105-109.

Brief discussion, with a table on methods available, classified according to size. Specifically deals with measurement of ultra-fine Fe powder by B.E.T. and X-ray line-broadening methods. (H11, Fe)

72-H. Sintered Alloys For High-Temperature Service in Gas Turbines. R. W. A. Buswell, I. Jenkins, and W. R. Pitkin. *Powder Metallurgy Bulletin,* v. 6, Apr. 1952, p. 110-113. (Condensed from Iron and Steel Institute "Symposium on High Temperature Steels and Alloys For Gas Turbines".)

Previously abstracted from original; item 69-H, 1951.
(H15, T25, Co, SG-h)

73-H. National Cash Register Pioneers in High Density Iron Powder Parts. Philip R. Kalischer. *Precision Metal Molding,* v. 10, May 1952, p. 38-42, 70-74, 76-77.

Some of the actual parts being made from iron powder at N.C.R., and the fabricating procedures used. Photomicrographs. (H general, Fe)

74-H. (Book) **Aluminum Powders and Pastes: "The Tale of the Powdered Pig".** 84 pages. 1951. Reynolds Metals Co., 2500 S. 3rd St., Louisville 1, Ky.

Development of Al powders; modern production methods; applications to paints and coatings, to pyrotechnics; to heat reactions, to chemical processing, to powder metallurgy, to surgery and silicosis, miscellaneous uses; characteristics; testing and evaluation; and handling and storage.
(H general, L26, T general, Al)

75-H. Hot Pressing Applications Increase. *Steel,* v. 130, May 26, 1952, p. 80-82, 84.

The hot pressing of metal powder generally follows one of two procedures, hot forging or hot molding. In the former, normally cold pressed and sintered parts are removed hot from the sintering furnace and subjected to a forging operation, usually in water-cooled steel dies. In the latter procedure, pressing and sintering are performed simultaneously in one operation. Improved technique for production of tungsten carbide pieces in a number of sizes and shapes; other applications of the process.
(H14, W, C-n, AY, CN)

76-H. Sintered-Iron Pieces. (In German.) G. F. Hüttig and A. Vidmajer. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften,* v. 83, No. 2, 1952, p. 365-376.

Factors which affect the density, specific electrical conductivity, hardness, and tensile strength were investigated. Tables and graphs illustrate the effects of fineness of powder, compressive force, and sintering temperature. 14 ref. (H11, Fe)

77-H. Surface Areas of Metals and Metal Compounds: A Rapid Method of Determination. C. Orr, Jr., H. G. Blocker, and Susan L. Craig. *Journal of Metals,* v. 4, June 1952, *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, p. 657-660.

Fatty-acid adsorption can be used to determine the surface area of a variety of powdered metals and metal compounds, and offers further confirmation of the correctness of gas-adsorption methods. Presents a simplified technique for determination of surface area which is suitable for routine work. 22 ref. (H11)

78-H. Problem of Coring Small Holes Solved by Powder Metallurgy. Fred O. Schulz. *Precision Metal Molding,* v. 10, June 1952, p. 25.

Fabrication of shower-head disks from Ni bronze powder.
(H general, Cu)

79-H. Powder Metallurgy. *Mining Journal,* May 1952, p. 101, 103, 105.

Reviews 1951 developments, dealing with such topics as rolling strip from Fe powder; metal-ceramics; alloyed powders; stainless steel; tungsten carbide; and testing and study methods.
(H general, Fe, AY, SS, C-n)

80-H. Report of Committee B-9 on Metal Powders and Metal Powder Products. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 214-215.

Previously abstracted from Preprint 14; item 53-H, 1951.
(H general, S22, Cu)

81-H. The "Flywheel" Effect in Infiltrated Metal Powder Parts. George Stern. *Metal Powder Association,* "Proceedings Seventh Annual Meeting", 1951, p. 14-18; disc., p. 18-21.

Iron skeletons, varying in density from 75 to 90%, were prepared from standard reduced Fe powder. The bars were pressed to approximately 70% density, sintered at 2100° F. for 1 hr. in cracked NH_3, then coined to densities between 75 and 90%. They were then infiltrated with Cu alloy to produce products varying from 85 to 100% of theoretical density. After identical heat treatment, effects of percentage infiltration on tensile strength, yield point, elongation, area reduction, and hardness were determined. Tables and graphs. (H16, Q general, Fe)

82-H. Sintered Iron Powder Rotating Bands for Ordnance Use. Alden M. Burghardt. *Metal Powder Association,* "Proceedings, Seventh Annual Meeting", 1951, p. 41-45; disc., p. 45-48.

See abstract from *Industrial Heating;* item 74-H, 1951.
(H general, T2, Fe)

83-H. A Metallographic Study of the Sintering of Brass Powders. C. J. Bier. *Metal Powder Association,* "Proceedings, Seventh Annual Meeting", 1951, p. 49-56; disc., p. 56-58.

Changes in microstructure which occur on sintering brass briquettes were studied. Effects of briquetting pressure, sintering temperature, and time in the hot zone were investigated. Charts and photomicrographs. (H15, M27, Cu)

84-H. (Czech.) **Some Notes on the Pressing of Powdered Materials.** Curt Agte and Miroslav Petrdlik. *Hutnické Listy,* v. 7, Mar. 1952, p. 121-124; Apr. 1952, p. 190-194.

Theory and practice. Tabular and graphical data on properties of a wide variety of powdered-metal combinations. Includes calculation procedures. 13 ref. (H14, Q general, P)

85-H. (Czech.) **Sintered Materials for Gas Turbines.** Adolf Vambersky. *Hutnické Listy,* v. 7, Mar. 1952, p. 129-132.

Stresses the importance of powder metallurgy in the development of new alloys including metal-ceramic mixtures for very high temperatures. (H general, T25, SG-h)

86-H. Hot Molding Increases Scope of Powder Metallurgy. Jerome F. Kuzmick. *American Machinist,* July 7, 1952, v. 96, p. 132-136. (Condensed from paper presented at 8th annual meeting, Metal Powder Association.)

The equipment used, some of the applications, and advantages and limitations of the process. (H14)

87-H. Report of Committee B-9 on Metal Powders and Metal Powder Products. *American Society for Testing Materials,* Preprint 15, 1952, 7 pages.

Consists largely of proposed tentative recommended practice for evaluating microstructure of apparent porosity in cemented carbides. Includes micrographs. (H11, M27, C-n)

88-H. (German.) **The Effect of Grain Size of the Powder on Behavior of Sintered Iron During Nitriding.** Werner Köster and Josef Raffelsieper. *Archiv für das Eisenhüttenwesen,* v. 23, May-June 1952, p. 225-228.

Effects of grain size with absorption of Ni on density, on rate of sintering and nitriding, and on nitriding temperature. Behavior of the sintered product during machining, its corrosion resistance, and its hardness. Tables and graphs. (H15, Q29, R general, G17, Fe)

89-H. Progress in Powder Metallurgy With Special Reference to High Temperature and Hard Metal Alloys. W. D. Jones. *Journal of the Chemical, Metallurgical & Mining Society of South Africa,* v. 52, Mar. 1952, p. 216-222.

Mixing and milling; pressing; sintering; shaping; high-temperature alloys; porous metals and electrical applications; and powder manufacture. (H general, SG-h, m)

90-H. Technology of Prealloyed Stainless Steel Powders—Properties, Production, Uses. Part I. Arthur H. Grobe and George A. Roberts. *Precision Metal Molding,* v. 10, July 1952, p. 23-26, 67-70.

Growing interest in the use of pre-alloyed powders by the powder-metallurgy industry. Production methods and tables of properties. A large number of practical applications. Diagrams and photographs. (H12, T general, P general, Q general, SS)

91-H. Carbide Dies Effectively Used in Powder Metallurgy. Kenneth M. Gleszer. *Precision Metal Molding,* v. 10, July 1952, p. 31, 74-77.

How to secure maximum life from dies and punches used to mold metal powders, by using tungsten carbide dies. (H14, T5, W. C-n)

92-H. Practical Applications of Hot Pressing. Jerome F. Kuzmick. *Materials & Methods,* v. 36, July 1952, p. 84-87.

Applications of hot molding to production of tungsten carbide dies and shaped pieces, heavy metal products, and high-temperature alloys from metal powders. (H14, SG-h, W, C-n)

93-H. Extinction Effects in Powders. R. J. Weiss. *Proceedings of the Physical Society,* v. 65, sec. B, July 1, 1952, p. 553-555.

Brief mathematical discussion of an attempt to explain intensity differences for cold worked and annealed metal-powder samples. (H11)

94-H. (German.) **Sintering of Silver Powder by Use of Silver Compounds.** R. Palme. *Metall,* v. 6, July 1952, p. 369-371.

Reports on investigations aiming at diminishing the swelling of Ag sintered bodies caused by gas inclusions. Effects of an addition of 15 and 40% Ni, 2% graphite, or 6% CdO on density of the sintered bodies are charted. (H15, Ag)

95-H. (French.) **Acceleration of Single-Phase Sintering. Discussion of the Mechanism of Action of Mineral Additions.** Serge Tacvorian. *Comptes Rendus hebdomadaires des Séances de l Académie des Sciences,* v. 234, June 9, 1952, p. 2363-2365.

Applied to refractory powders of different types: W, Th, graphite,

Al_2O_3, MgO, ThO_2, carbides, etc. Shows effects of a small quantity of liquid phase, generally in equilibrium with the solid phase at the temperature considered.
(H15, W, Th, C-n)

96-H. (German.) **Proposed Methods for Testing Metal Powders.** Rolf Schwalbe. *Stahl und Eisen,* v. 72, July 17, 1952. p. 898-903; disc., p. 903-904.

Methods for sampling and for determination of chemical composition, shape and size of grains, grain-size distribution, and powder-metallurgy characteristics (pouring and compression). Compilation of test values for several iron powders.
(H11, Fe)

97-H. Powder Metallurgy as a Research Tool. H. W. Greenwood. *Metallurgia,* v. 46, July 1952, p. 8-10.

Advantages of using powder-metallurgy methods in metallurgical research. (H general)

98-H. Porous Stainless Steel; a New Filter Material. *Metallurgia,* v. 46, July 1952, p. 38.

Production, properties, and applications of British product.
(H general, T29, SS)

99-H. Technology of Pre-Alloyed Stainless Steel Powders—Properties, Production, Uses. Part 2. Arthur H. Grobe and George A. Roberts. *Precision Metal Molding,* v. 10, Aug. 1952, p. 36-33, 74-75.

Summarizes results of extensive mechanical testing of sintered bars made from five types of stainless steel powder. Relationships to compacting and coining pressures and to sintering and resintering temperatures.
(H general, Q general, SS)

100-H. Powder Metallurgy Parts in High Temperature Applications. Julius J. Harwood. *Materials & Methods,* v. 36, Aug. 1952, p. 87-91.

Development and use of Cu-infiltrated iron, Ti alloy powders, sintered Al powder, Mo-base alloys, and "cermets." Shortages and service limitations of present high-temperature alloys are hastening their development. Tables and graphs show mechanical and oxidation characteristics. 10 ref.
(H general, Q general, R2, Cu, Ti, Fe, Al, Mo, SG-h)

101-H. (French.) **"S.A.P.", a New Material Made From Aluminum Powder Sintered Hot.** A. von Zeerleder. *Metaux: Corrosion—Industries,* v. 27, June 1952, p. 274-277.

SAP (sintered aluminum powder), its fabrication, applications, and mechanical properties, the latter being compared with those of "Alloy Y", Avional, and pure Al. Graphs and tables.
(H general, Q general, Al)

102-H. (German.) **Powder-Metallurgical Production of Semi-Finished Products From Nonferrous Metals.** H. Franssen. *Metall,* v. 6, Aug. 1952, p. 444-446.

Various processes; advantages of the nonferrous metals over Fe for many purposes. (H general, EG-a)

103-H. (German.) **Impregnated Iron-Copper Materials.** A. Vidmajer. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften,* v. 83, No. 3, 1952, p. 664-677.

These materials are intermediate in properties between alloys and mixtures with properties usually different from and superior to those of its components. Preparation of porous Fe compacts and their impregnation with Cu. Rupture strength, hardness, and electrical properties of compacts, porous sintered bodies, and impregnated bodies are compared.
(H16, Q23, Q29, P15, Fe, Cu)

104-H. (German.) **Trends in the Design and Use of Sintered-Iron Friction Bearings.** Werner Schroeder. *Technik,* v. 3, Apr. 1952, p. 181-188.

Production and properties of sintered iron. Production machining, designing, operating conditions, lubrication, tolerances, and possible uses of the bearings. Diagrams, tables, and graphs. 19 ref.
(H general, T7, Fe)

105-H. Ingenious Tools Make Complex Metal-Powder Parts. *American Machinist,* v. 96, Sept. 1, 1952, p. 105-109.

Pressing tools, and sizing equipment for holding close tolerances. Diagrams and photographs show typical pieces produced by Michigan Powdered Metal Products Co., Northville, Mich. (H14)

106-H. Diffusion in Sintering. Pol Duwez. *American Society for Metals* "Atom Movements", 1951, p. 192-208.

The part played by diffusion in sintering, and the sintering process as a whole. A one-component system (case of a pure metal), and multicomponent systems (several metals) in which alloying takes place as an additional process. Literature data on Cu, Fe, Zn, and Au. Diagrams and graphs. 22 ref.
(H15, N1, Cu, Fe, Zn, Au)

107-H. A High Temperature Sintering Furnace. J. H. Rendall. *Journal of Scientific Instruments,* v. 29, Aug. 1952, p. 248-250.

A laboratory furnace which can heat refractory metals very efficient-

ly. It can be heated to or cooled from high temperature in less than 10 min. and the specimen can be lowered into or raised from the hot zone while the furnace is at temperature. As the furnace contains no refractory materials to absorb heat, it rapidly attains the equilibrium temperature corresponding to a particular power input. Diagrams. (H15, SG-h)

108-H. Sintered Aluminum Powder: The Development of SAP. *Metal Industry,* v. 81, Aug. 22, 1952, p. 143-146.

Advantages of German development, giving tabulated information on physical and mechanical properties of the powder and the sintered products. (H general, Al)

109-H. Pressure Conditions in Metal Powders During Pressing Procedure. C. Ballhausen. 4th International Mechanical Engineering Congress, June 1952, 12 pages.

A principle of conformity exists between the behavior of a metallic powder being pressed in a mold and the behavior of a rope moving on a pulley, except that in one case pressure and in the other case tension must be applied. Experimental data on Pb, Cu, Fe, and steel. Diagrams, photographs, and graphs. (H14, Pb, Cu, Fe, ST)

110-H. Grain Formation in Hard Metal Alloys. Walther Dawihl. *Microtecnic* (English Ed.), v. 6, Sept. 1952, p. 165-173. (Translated from the German.)

Occurrence and influence of intermediate layers on grain formation in sintered alloys of WC in combination with Co, and with Ni. 11 ref. (H15, Co, Ni, W, C-n)

111-H. (German.) Activity of Finely Grained Powder and Its Influence on the Sintering Process. J. Hinnüber and O. Rüdiger. 4th International Mechanical Engineering Congress, June 1952, 22 pages.

How the activity of a finely-grained powder can be measured by a number of methods. Sintering process and properties of sintered products depend on condition of the powder used. Measurements made with four different tungsten powders. Mechanical properties of hard metal alloys. Electron-microscope data on primary particles and recrystallized grains in tungsten carbide-cobalt-alloys. Graphs, tables, photographs, micrographs. 15 ref. (H11, H15, Q general, W, C-n, Co, SG-m)

112-H. (German.) Rolling of Metal Powders. Gerhard Naeser. 4th International Mechanical Engineering Congress, June 1952, 14 pages.

Introduction of metal powders into the gap of rolls arranged adjacent to each other results in an endless strip which by repeated short sintering and cold and hot rolling will attain the properties of strip as made by the usual process. Effect of rolling factors on density and strength of the compressed strip; determination of sintering times and of change occurring in strength with the number of cold-rolling passes; and manufacture of Fe, Cu, and brass strips and determination of their characteristics. Diagrams, graphs, and tables. (H14, F23, Fe, Cu)

113-H. Friction Materials. K. G. Thafvelin. 4th International Mechanical Engineering Congress, June 1952, 10 pages.

Manufacture and treatment of materials composed of metal powder mixed with powdered nonmetallics; desired properties; choice of materials; and service. Photographs and graph. (H general, T7, SG-c)

114-H. Reactions During Sintering of a Zirconium Carbide-Niobium Cermet. W. G. Lidman and H. J. Hamjian. *Journal of the American Ceramic Society,* v. 35, Sept. 1952, p. 236-240.

A zirconium carbide-columbium cermet sintered under pressure was investigated. Effect of the variables, sintering temperature, and time at temperature, on the crystallographic structures was examined by back-reflection x-ray diffraction. (H15, M26, Zr, Cb, C-n)

115-H. The Application of Sintered Iron and Steel Parts in the Mechanical Industry. S. I. Hulthén. 4th International Mechanical Engineering Congress. June 1952. 12 pages.

Powder production and economics; advantages and disadvantages of powder metallurgy as a production method; chief steps in the process; and application and economy. (H general, Fe, ST)

116-H. (French.) Some Porous Materials Obtained by Sintering Without Pressure. Maurice Claude. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 235, July 16, 1952, p. 172.

By using welding fluxes such as borax, and operating under atmospheric pressure, at temperatures higher than the melting point of the material being tested, it was possible to obtain sintered metal bodies of desired porosity for different applications. (H15)

117-H. (Portuguese.) Effect of Particle Size on Certain Properties of Sintered-Iron Products. Carlos de Revorédo

Barros. *Boletim da Associacao Brasileira de Metais,* v. 8, Jan. 1952, p. 32-47.

The necessity of checking the raw material used in the powder metallurgy industry was investigated, in order to obtain uniformity of the final product. Influence of particle size on certain physical properties of sponge and electrolytic Fe powder was investigated. Table, graphs, and photomicrographs. (H11, Fe)

118-H. For Hot Jets: A Man and a Gun. *Business Week,* Sept. 20, 1952, p. 66-68, 71-72, 74, 76.

Production and shaping of Kentanium, a new alloy for jet engine parts. It is made of Ti, Ta, and Cb carbides plus Ni as a binder and is fired in a cannon. (H general, T25, Ti, Ta, Cb, Ni, C-n, SG-h)

119-H. The Plansee Seminar. A Brief Account of the Conference Proceedings. *Metallurgia,* v. 46, Aug. 1952, p. 94-98.

Conference, sponsored by the Metalwork Plansee, held at Reutte, Austria, June 1952. Main themes were: physical metallurgy; hard metals; and general powder metallurgy. 11 ref. (H general)

120-H. (Japanese.) **Research on the Sintering of Doped Tungsten Powder.** Chikao Ushioda, Gen-ichi Nakazawa, and Makoto Terui. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 16, Jan. 1952, p. 63-66.

Although no satisfactory explanation of the action of doping can be given, its effect on sintering seems to be that when doping reagents volatilize, a finer grain size is produced than in pure tungsten. FeO impurities are appreciably reduced by action of these agents. Relationships of sintering current to shrinkage, hardness, resistivity, and apparent specific gravity are charted. (H15, H11, W)

121-H. Trapping of Gases in Cold-Compacted Powders. J. Williams. *Journal of the Iron and Steel Institute,* v. 172, Sept. 1952, p. 19-24.

A study to determine extent to which gas could be entrapped under varying compacting conditions for such dissimilar materials as iron and thoria powders. State of the trapped gases and theory. Tables and apparatus diagram. (H14, Fe)

122-H. Explosive Pressing Forms New Material. Ed. Karpick. *Steel,* v. 131, Sept. 29, 1952, p. 76-77.

Cemented titanium carbide shapes for a variety of high-temperature and wear resistant applications show promise as engineering materials. Uniform density achieved by an explosion under liquid in an old Army 14-in. gun. Called Kentanium, the new carbide uses 30% Ni as a binder and a small addition of Cb-Ta carbide to aid oxidation resistance. Machining problems. (H14, G17, Ti, C-n, SG-h, m)

123-H. Zirconium Carbide Powder; Experiments in Hot Pressing. *Chemical Age,* v. 67, Oct. 4, 1952, p. 469-474. (Based on paper by A. R. Hall and W. Watt)

Experiments on preparation and properties of sintered Zr carbides produced without use of a bonding material. Two types of powder prepared from a commercial material of specified analysis were used. (H14, Zr, C-n)

124-H. Tungsten Carbide by Pyrolysis of Tungsten Hexacarbonyl. Dallas T. Hurd, H. R. McEntee, and P. H. Brisbin. *Industrial and Engineering Chemistry,* v. 44, Oct. 1952, p. 2432-2435.

Experimental methods. Diagrams and tables. (H10, W, C-n)

125-H. Sintered Aluminium With High Strength at Elevated Temperatures. R. Irmann. *Metallurgia,* v. 46, Sept. 1952, p. 125-133.

Factors involved in the production of sintered compacts prepared from pure Al powder which are stronger and superior to pure Al and its usual alloys. Compares mechanical, physical, and corrosion properties with those of pure Al and a number of its alloys. Applications. Diagrams, graphs, and micrographs. (H15, Q general, Al)

126-H. (Book.) **La Metallurgia des Poudres.** (Powder Metallurgy.) Robert Girschig. 100 pages. 1952. Editions de la *Revue d'Optique,* 165 rue de Sevres, Paris (15e) France.

Practical aspects of powder metallurgy. Includes survey of applications (H general)

127-H. (German.) **Production of Iron-Zinc Alloys From Amalgams.** Franz Lihl and Adolf Demel. *Zeitschrift für Metallkunde,* v. 43, Sept. 1952, p. 307-310.

Critically discusses earlier suggestions for producing Fe-Zn alloys. Production of these alloys by powder metallurgical means in which powdered amalgams are used. Tabulated data and X-ray diagrams. 14 ref. (H general, Fe, Zn)

128-H. (Pamphlet) **Research on Surface Properties of Fine Particles.** J. M. Dallavalle, Clyde Orr, Jr., and H. G. Blocker. Georgia Institute of Technology, State Engineering Experiment Station, Atlanta, Quarterly Report No. 3, Project 131-119, Jan. 30, 1952, 30 pages.

In relation to surface area measurements, a number of experimental results relative to the continuous-flow method are presented. Rate of adsorption method is described and a few experimental results given. Among the powders used are Fe, Ni, and Cu. Graphs. (H11, Fe, Ni, Cu)

129-H. Special Report: Powder Metallurgy in Sweden. *Product Engineering,* v. 23, Nov. 1952, p. 200.

Swedish progress in using iron and steel powders for equipment parts. (H general, Fe, ST)

130-H. (German.) **The Particular Situation of Powder Metallurgy in the Manufacture of Permanent Magnets.** Werner Hotop. 4th International Mechanical Engineering Congress, June 1952, 25 pages.

Advantages, limitations, fields of application, and comparison with cast materials. Magnetic properties. Tables and graphs. (H general, P16, SG-n)

SECTION J

HEAT TREATMENT

1-J. Heat-Treatment of Grey Cast Iron. *Foundry Trade Journal,* v. 91, Nov. 1, 1951, p. 517-518.

Discussion of Report of Sub-Committee T. S. 31 of Institute of British Foundrymen. See item 203-J, 1951. (J general, CI)

2-J. Flame Hardening Proves Versatile Heat Treating Method. Stephen Smith. *Iron Age,* v. 168, Nov. 22, 1951, p. 96-98.

Close control of surface hardening and depth of hardness is possible with the flame hardening setup at National Forge & Ordnance Co. Large or small areas are surface hardened with equal facility and less expense than with other comparable means. (J2, ST)

3-J. Heat Treating the Carburizing Grades of Boron Steels. Kenneth Rose. *Materials & Methods,* v. 34, Nov. 1951, p. 66-68.

Avoiding excessive core hardenability and obtaining satisfactory case hardness in large-section parts are major problems. Recommended procedures. Experiences of several companies. (J28, AY)

4-J. Effects of Some Solution Treatments Followed by an Aging Treatment on the Life of Small Cast Gas-Turbine Blades of a Cobalt-Chromium-Base Alloy. II. Effect of Selected Combinations of Soaking Time, Temperature, and Cooling Rate. C. A. Hoffman and C. F. Robards. *National Advisory Committee for Aeronautics,* Technical Note 2513, Oct. 1951, 19 pages.

Investigated for Haynes Stellite Alloy 21. Six heat treatments were studied. The treatments were followed in each case by aging at 1500° F. for 72 hr. Twenty blades taken from each of the six heat treated groups, together with 22 as-cast blades, were assembled in a small gas turbine.
(J27, Co, SG-h)

5-J. Comparative Surface-Hardening Characteristics of Commercial Pearlitic Malleable Irons. S. H. Bush, W. P. Wood, and F. B. Rote. *Transactions of the American Society of Mechanical Engineers,* v. 73, Nov. 1951, p. 1093-1099.

See abstract of "Pearlitic Malleable Irons Can Be Successfully Surface Hardened," *Materials & Methods,* item 114-J, 1951. (J2, CI)

6-J. The Martempering Treatment for Reducing Distortion and Cracking. J. Lomas. *Machinery Lloyd* (Overseas Edition) v. 23, Oct. 27, 1951, p. 84-88.

Describes the above. The process is of particular value for tools where dimensional stability is important. It has also been used widely for other steel components. (J26, ST)

7-J. On Austenitic Malleable Cast Iron. (Report 1). Nobuhisa Tsutsumi. *Reports of the Casting Research Laboratory,* No. 2, 1951, p. 42-45.

Research directed toward getting blackheart malleable cast iron by one-stage annealing. Tensile strength and hardness values of this cast iron. (J23, Q27, Q29, CI)

8-J. Batch Furnaces Achieve Continuous Production Rates. George Brailsford. *Steel,* v. 129, Dec. 3, 1951, p. 86-87.

See abstract of "Continuous Production Assured With Batch Furnaces", *American Machinist,* item 254-J, 1951. (J26, J29)

9-J. Production Heat Treating With Batch Furnaces. George Brailsford *Steel Processing,* v. 37, Oct. 1951, p. 569-571.

Features of the Atmotrol muffle furnaces. Parts were forged from SAE 8640 and SAE 1035 stock. See also items 254-J, 1951 and 8-J, 1952. (J26, J29, ST)

10-J. Production Non-Ferrous Wire Annealing at Bridgeport Brass. *Steel Equipment & Maintenance News,* v. 4, Nov. 1951, p. 12.

Includes a schematic drawing showing the construction of the finish annealing furnace. (J23, Cu)

11-J. Heat Treatment and Pickling of the Stainless Steels. Lester F. Spencer. *Magazine of Tooling and Production,* v. 17, Dec. 1951, p. 52-55, 72, 76.

An illustrated survey.
(J general, L12, SS)

12-J. Heat Treatment of Metals. Part II. Carroll B. Mershon. *Industrial Heating,* v. 18, Nov. 1951, p. 2002, 2004, 2006.

Special operations, including austempering (interrupted quenching), carburizing, nitriding, and flame hardening of metals. Equipment for fuel-fired furnaces, furnace atmospheres and agents, and temperature measurement.
(J26, J28, J2, S16)

13-J. Canada s Largest Stress Relieving Furnace Installed at Dominion Bridge. *Canadian Metals,* v. 14, Nov. 1951, p. 30.
(J1)

14-J. Flame Hardening for Economic Heat Treating. Edwin F. Green. *Canadian Metals,* v. 14, Nov. 1951, p. 36-38, 40.

Process and equipment, its applications, and advantages. Confined to steels and cast irons. (J2, ST, CI)

15-J. Stamps, Dies and Punches; Treatment and Metallurgical Control at Edward Pryor & Son, Ltd. *Iron and Steel,* v. 24, Nov. 1951, p. 523-526.

How strict metallurgical control maintains high mechanical properties and dimensional accuracy.
(J general, Q general, T5, ST)

16-J. The Surface Hardening of Steel. Part X. Cyaniding Practice. G. T. Colegate. *Metal Treatment and Drop Forging,* v. 18, Nov. 1951, p. 507-514.

Influence of bath compositions and treatment after cyaniding on the properties of the case formed. Specialized processes, including Chapmanizing, dry cyaniding, and the Ni-carb process. (To be continued.) (J28, ST)

17-J. Study of the Thermal Treatment of Duralumin. (In French.) Pierre Laurent and Henri Jarlan. *Revue de Métallurgie,* v. 48, Oct. 1951, p. 759-764.

Influence of rate and temperature of hardening on the hardness of a treated duralumin. (J27, Q29, Al)

18-J. Recommended Heating and Holding Times in the Practical Annealing and Heat Treatment of Steels. (In German.) Walter Hülsbruch. *Stahl und Eisen,* v. 71, Nov. 8, 1951, p. 1219-1225.

Investigated for five low-alloy steels. Effects on grain size and toughness were determined. 28 ref.
(J23, Q23, AY)

19-J. Reduction of Inherent Welding Stresses by Means of Progressive Heating Below 200° C. (In German.) K. Wellinger and N. Ludwig. *Schweissen und Schneiden,* v. 3, Nov. 1951, p. 344-347.

Reviews earlier methods and American experiments leading to a method for reduction of inherent welding stresses in steels by localized heating. German tests verifying the American results. 18 ref.
(J1, ST)

20-J. Investigation on the Suitability of Steel and Cast Iron for Case Hardening by High-Frequency Currents. (In Polish.) F. Staub and K. Pogorecki. *Prace Glownego Instytutu Metalurgii,* v. 3, no. 5, 1951, p. 375-387.

Results of investigations on the case hardening of steel, steel castings, and cast iron by induction heating with high-frequency currents. Effect of surface temperature on hardness of the surface layer, as well as effect of heating on depth of hardening. (J28, ST, CI)

21-J. Comparative Study of Thermal Treatments of Steel and Their Definitions. (In Portuguese.) Werner Grundig. *Boletim da Associacao Brasileira de Metais,* v. 7, July 1951, p. 283-320.

Taking as a basis microstructures met in heat treated steel, attempts to define various heat treatment processes, describing the formation and characteristic microstructures encountered. 14 ref.
(J general, M27, ST)

22-J. (Book) **An Evaluation of the Hardening Power of Quenching Media for Steel.** E. J. Eckel, R. M. Mayfield, G. W. Wensch, and F. A. Rough. 131 pages. University of Illinois, Urbana, Ill. $1.50.

A survey of 30 quenching mediums. (J2, ST)

23-J. Step Quenching, Hot Peening Improve Lean Alloys. R. F. Harvey. *Iron Age,* v. 168, Dec. 27, 1951, p. 70-71.

A modified step-quench treatment for toolsteels wherein higher intensities of peening may be used safely without danger of cracking.
(J26, G23, TS)

24-J. Basic Parts That Mean So Much. John A. Caswell. *Instrumentation,* v. 5, 4th qtr., 1951, p. 10-11.

Heat treating furnaces and controls used in production of critical aircraft components at Tube Turns, Inc., Louisville, Ky. (J general, S16)

25-J. The Relative Effects of Chromium and Silicon Contents on Rate of Anneal of Black-Heart Malleable Iron. Part I. First Stage Annealing. Part II. Second Stage Annealing. J. E. Rehder. *Transactions of the American*

Foundrymen's Society, v. 59, 1951, p. 244-251; disc., p. 251-252.

Previously abstracted from Preprint 51. See item 136-J, 1951. (J23, N8, CI)

26-J. Malleable Cast Iron—Annealing Furnaces and Atmosphere. O. E. Cullen and R. J. Light. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 494-499; disc., p. 499-500.

Previously abstracted from Preprint 62. See item 137-J, 1951. (J23, CI)

27-J. Some Jominy Tests on Fine Carbon Steel and Special Low-Alloy Steel. (In French.) *Circulaire d'Informations Techniques,* v. 8, Nov. 1951, p. 1283-1293.

Five types of steel were used. Tests were conducted on various special heats of steel. (J26, CN, AY)

28-J. Influence of Test Conditions on End-Quench Testing of Steels. (In German.) Walter Peter and Adolf Rose. *Archiv für das Eisenhüttenwesen,* v. 22, Sept.-Oct. 1951, p. 303-312.

Tests were done on six German low-alloy steels in order to determine the influence of variations of testing conditions on the results. 12 ref. (J26, AY)

29-J. How Flame and Induction Heating Work. John Obrebski. *American Machinist,* v. 96, Jan. 7, 1952, p. 122-125.

Clarified by schematic diagrams showing application to various steel parts. (J2, ST)

30-J. Keeping Gas Utilization in Step With Product and Progress. Jack Huebler. *Industrial Gas,* v. 30, Dec. 1951, p. 7-10, 22-23.

The integrated mechanical handling of steel to and from heat treating furnaces. Various installations for hardening, carburizing, heating of forging billets, annealing, carbon restoration. (J general, A5)

31-J. Batch Furnaces for Continuous Production Proved Themselves in World War II. George Brailsford. *Industrial Gas,* v. 30, Dec. 1951, p. 3-5, 24-25.

Battery of standard, batch-type, full-muffle, gas-fired furnaces which harden tank-tread links in quantities equivalent to a large continuous installation without major production losses due to down-time. (J26, ST)

32-J. Induction Hardening of Coupling Bolts Improves Production. *Industrial Heating,* v. 18, Dec. 1951, p. 2186.

Use of a General Electric Induction heater at De Laval Steam Turbine Co., Trenton, N. J., has cut coupling-bolt hardening costs 70% and increased production. (J2, ST)

33-J. Heat Treating of Tools and Dies Featured at Patton Manufacturing Co. *Industrial Heating,* v. 18, Dec. 1951, p. 2194, 2196, 2198, 2200, 2202, 2204, 2206.

Heat treating furnaces and associated control equipment of Springfield, Ohio, plant. (J26)

34-J. Continuous Furnaces Economically Treat a Variety of Parts. Charles W. Heilman. *Materials & Methods,* v. 34, Dec. 1951, p. 87-88.

Practice at Commonwealth Industries, Detroit, whereby a pair of continuous, controlled-atmosphere, radiant-tube furnaces are used for hardening; case carburizing, dry cyaniding and carbonitriding on a jobbing basis. The speed of conveyors is varied to handle various size parts. (J26, J28)

35-J. High Production Heat Treatment of Steering Gear Parts. Geo. Goepfert. *Automotive Industries,* v. 106, Jan. 1, 1952, p. 50-52, 90, 92, 94.

Heat treatment procedures applied to steering cams made of SAE 8620 steel. (J general, AY)

36-J. Prepared Atmospheres—Their Generation and Application. Part I. C. George Segeler. *Industrial Heating,* v. 18, Oct. 1951, p. 1788, 1790, 1792, 1891-1892, 1896.

Generation and composition of prepared atmospheres used for various industrial operations, application of these atmospheres, and results obtained through their use in various metallurgical operations, including carburizing, cyaniding, annealing, brazing, hardening, and sintering. (To be continued.) (J2, K8, H15)

37-J. Martempering; Invention and Early History. Richard F. Harvey. *Iron & Steel,* v. 25, Jan. 1952, p. 14-16.

Surveys literature. References. (J26)

38-J. The Surface Hardening of Steel. Part XI. Flame Hardening. G. T. Colegate. *Metal Treatment and Drop Forging,* v. 18, Dec. 1951, p. 549-558.

The potentialities of flame hardening and its accompanying problems, including the design of gas jets, and design and position of the quenching jets. Various flame hardening techniques and influence of composition of the steel. Advantages and disadvantages of flame-hardening. (To be continued.) (J2, ST)

39-J. Flame Softening in Metal Fabricating Industries. William B. Sharav. *Steel Processing,* v. 37, Dec. 1951, p. 599-602, 613.

Three flame-softening methods. Costs, process results, and miscellaneous applications. (J2)

40-J. Hardenability Testing of Structural Alloy Steels. (In German.) Max Kroneis and Helmut Krainer. *Stahl und Eisen,* v. 71, Dec. 6, 1951, p. 1365-1374; disc., p. 1375.

Application of two hardenability testing methods to steels containing 0.25-0.40% C, 0.3-1.25% Si, 0.6-1.8% Mn, 0-0.8% Al, 0-2.4% Cr, 0-0.2% Mo, and 0-0.2% V. Advantages and disadvantages of the two methods. Graphs and tables. (J26)

41-J. Quench-Temper Treatment Improves Nodular Irons. J. E. Rehder. *Iron Age,* v. 169, Jan. 17, 1952, p. 89-93.

Results of an investigation to determine the effect of Si, Ni, Cu, P, Mo, and Mn on the mechanical properties of nodular irons. Results of quench-temper treatment on a large number of heats at various temperatures. (J26, J29, Q general, CI)

42-J. Flame-Hardening—A Flexible Method of Surface Treatment. H. V. Inskep. *Machinery* (American), v. 58, Jan. 1952, p. 166-171.

Flame hardening as applied to various types of parts. Data for cast irons, and carbon and alloy steels are tabulated. (J2, CI, CN, AY)

43-J. Putting the Starch in Steel. John Pfeiffer. *Steelways,* v. 8, Jan. 1952, p. 20-23.

Heating, quenching, and tempering methods for controlling the internal crystal structure of steel. Micrographs. (J26, J29, N8, ST)

44-J. Control of Rail-End Hardening. LaMotte Grover. *Welding Journal,* v. 31, Jan. 1952, p. 7-17.

Manual processes of flame hardening ends of ordinary carbon steel rail in the field using the compressed air-quench method and the self-quench method. (J2, CN)

45-J. Heat Treatment and Pickling of the Stainless Steels. (Continued.) Lester F. Spencer. *Magazine of Tooling and Production,* v. 17, Jan. 1952, p. 54, 56, 128, 130, 132, 150, 158, 164-167, 174.

The hardening procedure. Charts show the effect of Cr and C on the as-quenched hardness of three stainless steel compositions—Types 410, 403, and 416. Tables give temperature ranges for various types of stainless steels. Choice of furnace equipment. Methods of scale removal. 12 ref. (J26, L12, SS)

46-J. Gaseous Annealing of Malleable Castings; Operations at William Lee & Sons, Dronfield. J. C. Mantell. *Foundry Trade Journal,* v. 91, Dec 27, 1951, p. 741-744.

A year ago a standard Birlec 300-kw. elevator-type electric malleablizing furnace was installed, for annealing whiteheart malleable castings. Since that time, comprehensive and accurate records have been kept of the 90-odd heats annealed, and monthly digests of data have been derived from these day-to-day observations. (J23, CI)

47-J. Electrode Salt Baths. *Machinery Lloyd* (Overseas Edition), v. 23, Dec. 22, 1951, p. 87-89, 91, 93.

Use for obtaining heat-treatment temperatures between 550 and 1350° C. In addition, a layer of salt adheres to components being removed from the bath, thus preventing contact with the air and preventing scaling. (J2)

48-J. Marquenching. J. Lomas. *Machinery Lloyd* (Overseas Ed.), v. 24, Jan. 5, 1952, p. 91, 93-94.

Advantages and disadvantages of marquenching method of heat treatment involving quenching in hot oil. (J26)

49-J. Application of Hydrocyanic Acid in Case Hardening. (In German.) Alb. Stähler. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 93, Dec. 11, 1951, p. 1093-1097.

Results of experiments applied to various carbon and low-alloy steels. Results are charted, tabulated, and illustrated by photomicrographs. Vickers hardness and wear resistance were determined. (J28, Q29, Q9, CN, AY)

50-J. Study on Heat Treatment of Parts of Bicycle Chain. A Report on Strain Produced by Heat Treatment of the Inner Plate of Bicycle Chain. (In Japanese.) Etsuo Hayashi and Shigemitsu Demachi. *Journal of Mechanical Laboratory,* v. 5, Aug. 1951, p. 131-134.

Includes tables and graphs. (J26, CN)

51-J. Role of Boron Steels in the Present Emergency. P. R. Wray. *Industrial Heating,* v. 18, Oct. 1951, p. 1738-1740, 1742, 1936; Nov. 1951, p. 1986, 1988, 1990, 1992; Dec. 1951, p. 2220, 2222, 2224, 2226; v. 19, Jan. 1952, p. 62, 64, 66, 178, 180.

Emphasis on effects of boron on hardenability and associated transformation, mechanical properties, grain size, and applications. (J26, M27, Q general, AY)

52-J. Ford Automotive Parts Hardened by Dry Cyaniding. *Industrial Heating,* v. 19, Jan. 1952, p. 26-28, 30, 32-34, 186.

Furnace fired by 12 gas-fired radiant tubes for hardening automobile parts. Composition and hardness of carbon steel parts before and after heat treatment. Diagram gives layout, showing arrangement

of heating zones and quenching mechanism. (J28, Q29, CN)

53-J. Fast Quench Oil Improves Hardenability in Aircraft Steels. James McElgin. *Iron Age,* v. 169, Jan. 24, 1952, p. 72-74.

New high-speed quenching oil which makes possible maximum hardness penetration in thicker sections of aircraft low-alloy steels. Performance characteristics are compared. Data are graphed and tabulated. (J2, Q29, AY)

54-J. Heat Treated Properties Predictable in Complex Assemblies. J. L. Waisman. *Iron Age,* v. 169, Feb. 7, 1952, p. 146-149.

Technique used, for any shape of heat treatable parts, for specifying heat treatment. The system consists of a simple scheme for determining the diameter of a cylinder whose center has the same cooling rate as the center of the part in question. This diameter is called the "equivalent round" for that shape. (J26, ST)

55-J. Heat-Treatment of Titanium-Rich Titanium-Iron Alloys. H. W. Worner. *Journal of the Institute of Metals,* v. 80, Jan. 1952, p. 213-216.

Alloys with 2-6% Fe can be hardened appreciably by water quenching them from the β-Ti-Fe solid-solution region. Some of the alloys which could be retained as β-solid-solutions by water-quenching exhibited age hardening effects when heated for a few hours in the range 220-450° C. (J26, J27, Ti)

56-J. Rocket Parts Effectively Heat Treated in Mechanized Salt Bath Furnace. Kenneth Rose. *Materials & Methods,* v. 35, Jan. 1952, p. 90-91.

Heat treating steps for the above. SAE 4140 steel is used. (J2, AY)

57-J. Mechanized Heat Treatment Points to New Goals in Costs and Quality. Arthur H. Allen. *Metal Progress,* v. 61, Jan. 1952, p. 68-71.

How integration of heat treating equipment into the parts-production line makes it in fact a machine tool with built-in functions of loading movement and discharge. Highlights of progress in this field. (J general)

58-J. Annealing Steel Strip. *Metal Treatment and Drop Forging,* v. 19, Jan. 1952, p. 13-14.

The annealing plants at both the Abbey and Trastre Works of the Steel Co. of Wales Ltd. (J23, ST)

59-J. The Surface Hardening of Steel. Part XII. Induction Heating. (Concluded.) G. T. Colegate. *Metal Treatment and Drop Forging,* v. 19, Jan. 1952, p. 35-42.

The high-frequency induction heating technique for surface hardening. Principles involved and controlling factors for depth of hardening. A comparison is made with other surface hardening treatments already discussed in this series. 78 ref. (J2, ST)

60-J. Testing Round Carbon Drill Steel. Paul L. Russell. *Mining Engineering,* v. 4, Jan. 1952, p. 42-43.

Progress report of an experiment involving heat treatment of the shank ends of drill steel. Drilling tests were made on two types of rock. The purpose was to determine the effect of an increase in soaking time during the hardening process. (J26, Q29, T6, TS)

61-J. Progress In Heat Treating and Furnaces in 1951. Howard E. Boyer. *Steel Processing,* v. 38, Jan. 1952, p. 17-19.

(J general)

62-J. Recent Work and Opinions on the Age Hardening of Aluminum Alloys. (In German.) F. Rohner. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 17, Nov. 1951, p. 332-336.

Critical review of literature reveals that earlier views on this phenomenon are being challenged. 23 ref. (J27, Al)

63-J. The "Hardenability" of Steel, a Contribution to the Clarification of Terminology. (In German.) E. Bickel. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 17, Nov. 1951, p. 347-348.

Proposes that a distinction be made between "hardenability" and "intensity of hardening". (J26, ST)

64-J. Investigation of Annealing Resulting From the Heat Involved in Hot Working, and Accompanying Isothermal Transformations. (In German.) Erich Theis. *Stahl und Eisen,* v. 71, Dec. 1951, p. 1433-1438; disc., p. 1438-1440.

Investigation on a roller-bearing steel containing 1% C and 1.5% Cr; structural steel containing 0.55% C, 1.0% Cr, and 0.10% V; "silver" steel containing 1.2% C and 1.0% W; high speed steel containing 0.95% C, 4.0% Cr, 3.0% Co, 2.3% V, and 10% W; stainless steels containing (1) 0.4% C and 13% Cr, (2) 0.25% C, 18% Cr, and 1.5% Ni; and toolsteel containing 0.5% C, 0.15% Mo, and 3% Ni. Advantages and applications of the process in which annealing intentionally results from the heat of hot working. (J23, N8, ST)

65-J. Heat Treatment of Large Forgings. (In Spanish.) R. Garcon. *Instituto del Hierro y del Acero,* v. 4, Apr.-June 1951, p. 170-178. (Translated from *Journées de la Grosse Forge.)*

Measurement of cooling velocities. Results of dilatometric tests on low-

alloy Cr-Ni-Mo and Cr-Ni steels. Data are tabulated and charted. (J26, M23, AY)

66-J. Effect of Low Temperatures on the Properties of Carbon and Special Steels. Subzero Treatment. (In Spanish.) *Instituto del Hierro y del Acero,* v. 4, July-Sept. 1951, p. 253-255. (Translated from *Aciers Fins et Speciaux Francais,* no. 5, June 5, 1950.)

Results of investigation of hardness and transformation effects are charted, tabulated, and discussed. (J2, Q29, CN, AY)

67-J. Some Cases of Application of Modern Heat Treatments to Spanish Special Steels. (In Spanish.) Manuel Torrado y Varela. *Instituto del Hierro y del Acero,* v. 3, Oct.-Dec. 1950, p. 309-322.

Heat treatments and resulting transformations and properties. Photomicrographs, charts, diagrams, tables, and photographs. 26 ref. (J general, N8, ST)

68-J. Are You Getting the Most From Your Water Sprays? W. P. Wallace and C. E. Manes, Jr. *Iron Age,* v. 169, Jan. 31, 1952, p. 112-114.

Speed of quenching with water sprays depends on droplet size and the breakdown of the insulating steam layer around the steel. Variables studied indicate water sprays can be used to greater advantage to promote deeper hardening. (J26, ST)

69-J. Charts Simplify Selection of Heat Treatable Steel. E. H. Stilwill. *Iron Age,* v. 169, Feb. 14, 1952, p. 130-133.

Selection of substitute steels is simplified by use of new metallurgical tables prepared by the Iron & Steel Technical Committee of the Society of Automotive Engineers. Tables take into account both section size and quenching medium to be used. They also differentiate between highly stressed parts requiring nearly an all-martensitic structure on the quench and those which do not have to be "quenched out." (J26, S22, ST)

70-J. Production Heat Treating. George Goepfert. *Steel,* v. 130, Feb. 11, 1952, p. 82-84, 112, 114.

Describes heat-treating procedure on steering-assembly parts generally made from SAE 8620 steel. All parts undergo one or more of three controlled-atmosphere processes — carburizing, cyaniding and clean hardening. (J2, J28, AY)

71-J. Continuous Annealing System Combines Several Operations. *Inco Magazine,* v. 25, Winter 1951-52, p. 15, 27.

Continuous strip annealing process at the American Brass Co.'s new brass mill in Buffalo, N. Y. Production of anncaled brass strip is accomplished by integrating a number of operations into one continuous system that may be readily controlled. (J23, F23, Cu)

72-J. Forced Air Circulation for Low-Temperature Heat Treatment. *Sheet Metal Industries,* v. 29, Feb. 1952, p. 124-126.

Furnaces and equipment used for heat treatment up to 700° C. (J general)

73-J. Summary of Progress on Investigation of Stress Relaxation in Rail Steel. D. R. Jenkins and H. J. Grover. *American Railway Engineering Association Bulletin,* v. 53, Feb. 1952, p. 916-920.

An investigation to determine possibilities of alleviation of residual stress or fatigue damage by heating rail steel to subcritical temperatures. (J1, CN)

74-J. Prepared Atmospheres—Their Generation and Application: II. C. George Segeler. *Industrial Heating,* v. 19, Feb. 1952, p. 226, 228, 230, 232, 234, 244.

Some of the practical complications which arise, and means for checking atmospheres before trouble begins. The effect of such factors as purification, oxidation, sooting, and contamination on atmosphere operation. (J2)

75-J. An Investigation of the Quenching Characteristics of a Salt Bath. M. J. Sinnott and J. C. Shyne. *Industrial Heating,* v. 19, Feb. 1952, p. 236, 238, 240.

See abstract from American Society for Metals, Preprint 29, 1951, item 223-J, 1951. (J2, SS)

76-J. Coil Annealing. Lee Wilson. *Iron and Steel Engineer,* v. 29, Feb. 1952, p. 66-72; disc., p. 72.

Use of single-stack annealing furnaces. Advantages. (J23)

77-J. Electric Furnaces for the Thermal Treatment of Non-Ferrous Metals and Alloys. C. J. Evans, P. F. Hancock, F. W. Haywood, and J. McMullen. *Journal of the Institute of Metals,* v. 80, Feb. 1952, p. 255-256.

Reviews types of furnaces available for thermal treatment of light alloys, Cu and Ni. Use of controlled atmospheres. Emphasis is on furnaces of highly specialized design, which work in conjunction with production lines. (J general, Al, Mg, Cu, Ni)

78-J. Gas Equipment for the Thermal Treatment of Nonferrous Metals and Alloys. J. F. Waight. *Journal of the Institute of Metals,* v. 80, Feb. 1952, p. 269-285.

Burner systems in common use in the nonferrous metal industry, with emphasis on automatic mixture-control devices, also furnace atmospheres. A catalytic sulfur-removal plant suitable for bright annealing furnaces. A number of furnace installations illustrate application of the various burner systems, and also the use of mechanical handling equipment. These installations include a copper billet heating furnace, tube annealing furnaces, and a cover furnace. In the field of light metals, billet heating furnaces, salt baths, and forced-circulation hot air furnaces are discussed.
(J general, F21, EG-a)

79-J. Batch and Continuous Annealing of Copper and Copper Alloys. Edwin Davis and S. G. Temple. *Journal of the Institute of Metals,* v. 80, Feb. 1952, p. 287-296.

Changes in annealing equipment and practices in the production of wrought Cu and Cu alloys. Annealing characteristics of representative Cu-base alloys. Effect of impurities on the softening of Cu alloys. Heat treatment other than annealing to produce soft material, such as stress-relief annealing, solution heat treatment, and tempering. Various types of batch and continuous furnaces, and factors influencing uniformity of annealing. Relative merits, limitations, and applications of both types of annealing.
(J23, Cu)

80-J. Bright Annealing of Nickel and Its Alloys. H. J. Hartley and E. J. Bradbury. *Journal of the Institute of Metals,* v. 80, Feb. 1952, p. 297-310.

Historical development. Conditions which must be fulfilled in different cases are reviewed from a theoretical standpoint. Variations in requirements of different alloys and effects of S and C in the annealing atmospheres. Clean annealing in belt-conveyor furnaces. Production of sulphur-free atmospheres from town gas. Methods of testing the suitability of purging-gas atmospheres for use in annealing these alloys, including a method which avoids dew-point measurements.
(J23, Ni)

81-J. Batch Thermal Treatment of Light Alloys. C. P. Paton. *Journal of the Institute of Metals,* v. 80, Feb. 1952, p. 311-322.

The processes of annealing, solution treatment, precipitation treatment, stabilization, and the principal differences in thermal conditions which they entail. Factors affecting the choice of a furnace, such as fuels, heating media, circulation of heating media, furnace atmospheres, temperature measurement and control, quenching and drying, general handling, and constructional materials. Current batch furnace design is criticized. Data for Al and some of its alloys. (J27, Al)

82-J. Flash Annealing of Light Alloys. R. T. Staples. *Journal of the Inst tute of Metals,* v. 80, Feb. 1952, p. 323-334.

Results obtained from treatments carried out on light alloys in a flash annealing furnace show that a wide range of thermal treatments can be successfully accomplished. The theoretical case in favor of employing high rates of heating to secure a fine grain size on recrystallization is supported by evidence obtained in industrial practice. Factors governing the design of a single-sheet, conveyor-type furnace. Performance data for Al and a few of its alloys. 16 ref. (J23, Al)

83-J. Continuous Heat Treatment of Aluminium Alloys of the Duralumin Type. Marcel Lamourdedieu. *Journal of the Inst tute of Metals,* v. 80, Feb. 1952, p. 335-339.

A plant designed for the continuous heat treatment of Duralumin-type alloys. Results of some tests on 24S Alclad. (J27, Al)

84-J. Automatic Control of Gas-Fired Heat Treatment Furnaces. Leo Walter. *Machinery* (London), v. 80, Feb. 14, 1952, p. 284-287.

Process-cycle control which enables heat treatments to be carried out in accordance with a predetermined time-temperature curve—for example, with a gradually rising temperature, followed by soaking, and a cooling period. The relative lengths of these periods can be varied at will, according to requirements.
(J general, S18)

85-J. Induction Heating for Continuous Heat Treatment of Sheet and Strip. F. C. Hull and Howard Scott. *Metal Progress,* v. 62, Feb. 1952, p. 57-61.

Results of investigations. Materials studied were low-carbon steel, 70-30 brass, 18-8 stainless steel, and Al alloys.
(J23, J27, CN, Cu, SS, Al)

86-J. Continuous Furnace for Fast Annealing of Tin-Plate. M. D. Stone and E. A. Randich. *Metal Progress,* v. 62, Feb. 1952, p. 62-66.

Results of an investigation on the above. Heat treatment furnace is diagrammed. (J23, CN)

87-J. Stress Relief in Magnesium Castings. *Metal Progress,* v. 62, Feb. 1952, p. 124, 126, 128. (Condensed from

"Stress Relief and Allied Problems in Magnesium Alloy Castings", R. J. M. Payne.)

Previously abstracted from *Journal of the Institute of Metals.* See item 49-J, 1951. (J1, Mg)

88-J. The Function of Energizers in Pack Carburizing. (In Swedish.) Axel Hultgren. *Jerkontorets Annaler,* v. 135, No. 11, 1951, p. 575-604.

Upon study of the various ways in which the energizers K_2CO_3, Na_2CO_3, and $BaCO_3$ may be placed in the carburizer box with crushed charcoal and the objects to be carburized, two methods were found to give the same results as mixing charcoal and energizer: K_2CO_3 or Na_2CO_3 applied separately, e.g., as a layer on top of the charcoal; and $BaCO_3$, applied as a thin coating on the steel surface, preferably with the aid of a binding agent. The coated specimens were packed in unmixed charcoal which had been washed thoroughly with dilute HCl. In carrying out the carburizing process on $BaCO_3$-coated steel objects, the presence of a small amount of K_2CO_3 in the charcoal or in the coating may interfere with the carburizing reaction in some unknown manner. Apparatus is diagrammed; data are tabulated. (J28, ST)

89-J. Continuous Bright-Annealing Furnace. *Engineering,* v. 173, Feb. 15, 1952, p. 223.

Includes illustration of a furnace used by a British firm for small-parts annealing. (J23)

90-J. Heat Treating Automotive Steering Assemblies. George Goepfert. *Steel Processing,* v. 38, Feb. 1952, p. 82-87, 101.

See abstract of "High Production Heat Treatment of Steering Gear Parts," *Automotive Industries;* item 35-J, 1952. (J general, AY)

91-J. Metallography and Modern Heat Treatments of Special Steels. (In French.) André Michel. *Métallurgie et la Construction Mécanique,* v. 83, Nov. 1951, p. 853-855, 857, 859-861, 871.

Isothermal annealing, interrupted quenching, austempering, subzero treatment, tempering, stabilization by aging, and thermal stress relief. Diagrams and tables.
(J general, N8, AY)

92-J. Case-Hardening. (In French.) Marcel Guedras. *Métallurgie et la Construction Mécanique,* v. 83, Dec. 1951, p. 997, 999-1001.

The metal, the case hardening compound, case hardening boxes, temperature, tempering, and causes of low surface hardness. (J28, ST)

93-J. Annealing of High-Strength Welds on Steam Generators. (In German.) A. Krause. *Brennstoff-Wärme-Kraft,* v. 4, Feb. 1952, p. 44-47.

Metallurgical principles of annealing, and annealing of a series of welds on closed vertical tubes. Development of suitable burners. Useful instrument for controlling the annealing operation. Photomicrographs, photographs, graphs, and tables. (J23, AY)

94-J. Flame Hardening of the Leading Edges of Steam Turbine Blades. (In German.) F. J. Overkott. *Brennstoff-Wärme-Kraft,* v. 4, Feb. 1952, p. 47-49.

Impact of droplets of condensation was found to reduce the life of turbine blades made of Cr steel. This difficulty can be reduced by reducing steam condensation and by flame-hardening the leading edges of the blades. Graphs, photographs, and photomicrographs. (J2, S21, AY)

95-J. Soft Annealing of High-Carbon Steels With Isothermal Transformation. (In German.) Walter Hulsbruch and Erich Theis. *Stahl und Eisen,* v. 72, Jan. 31, 1952, p. 123-131; disc., p. 131-133.

A method designed to yield a uniformly annealed structure with purely spherical cementite in steels. Tests on steel with varying amounts of Cr to determine effects of annealing temperature, annealing time, and rate of cooling. Economic and furnace-design problems. Tables, graphs, and micrographs.
(J23, N8, CN)

96-J. (Book) **Schnellstahle und ihre Warmebehandlung.** (High Speed Steel and Its Heat Treatment.) Willi Haufe. 276 pages. 1951. Carl Hanser Verlag, Munich 27, Germany. 29 D.M.

Considers not only the high-tungsten steel, but also the newly developed low-tungsten high speed steels containing less than 14% W. The influence of individual alloying elements on the properties of high speed steels, such as hot strength, tempering resistance, and wear resistance. Questions of heat treatment, etc., are dealt with from the user aspect. Surface treatments are also described.
(J general, Q general, L general, TS)

97-J. Surface-Hardening Machine. *Engineering,* v. 173, Feb. 29, 1952, p. 268-269.

Equipment utilizes an oxygen-fuel gas mixture. (J28)

98-J. Induction Heater for Surface Hardening. *Engineering,* v. 173, Feb. 29, 1952, p. 286-287.

Equipment used to harden certain types of steel shafts. (J2, ST)

99-J. Flame Hardener Treats Cams at High Speeds. W. G. Patton. *Iron Age,* v. 169, Mar. 20, 1952, p. 98-99.

How automatic-transmission cams are flame hardened at close to 550 pieces per hr. on an automatic machine at Buick Motor Div. After loading, the operator starts the automatic hardening cycle. Oxygen-propane flame brings cams to heat. Parts are dropped into the oil quench, then conveyed out of machine and deposited in tote pans. Parts are fabricated from SAE 1062 and 4063 steel. (J2, CN, AY)

100-J. Files and Tools; Advantages of Heat Treatment in Salt Baths. D. Thomas. *Iron & Steel,* v. 25, Mar. 1952, p. 85-88.

General advantages of salt-bath heat treatment; recent developments in salts produced for specific purposes; the technique; appropriate equipment; and particular advantages of each process. (J2, TS)

101-J. General Considerations on Suspended Arches and on Flame Undulations. (In French.) Louis Gascuel. *Métallurgie et la Construction méchanique,* v. 84, Feb. 1952, p. 111, 113.

A particular type of construction and its advantages when used in annealing furnaces for steel billets and blooms. Schematic diagrams. (J23)

102-J. Accuracy of Statistical Methods for the Computation of Carbon-Penetration Depths in Carburized Bars. (In German.) Hans Schrader. *Archiv für das Eisenhüttenwesen,* v. 22, Nov.-Dec. 1951, p. 411-415.

Critical discussion of a statistical computation method advanced by A. Slattenschek. The various discrepancies in the method are indicated, tabulated, and charted. (J28, ST)

103-J. The Effect of Alloy Elements on the Heat Treatment of Grey Cast Iron. M. M. Hallett. *Alloy Metals Review,* v. 8, Mar. 1952, p. 2-8.

Reviews the above; their effects on hardness and tensile strength. 30 ref. (J general, Q27, Q29, CI)

104-J. Bright Annealing Copper in Continuous Controlled Atmosphere Furnace. J. H. Bradley. *Canadian Metals,* v. 15, Mar. 1952, p. 56, 58.

Except for loading and unloading, continuous furnace operation in bright annealing copper is fully automatic at Canada Wire and Cable Co. plant. Diagram. (J23, Cu)

105-J. Flame Hardening. N. H. Cuke. *Canadian Metals,* v. 15, Mar. 1952, p. 62-64.

Its advantages as applied to steels and cast irons. Portable standard equipment is used for operating in shop or field. (J2, CI, ST)

106-J. Production Heat Treatment of Ross Automatic Steering Assemblies. George Goepfert. *Industrial Heating,* v. 19, Mar. 1952, p. 408-410, 412, 414, 416, 418, 420, 422, 424, 571.

Equipment and procedures of Ross Gear & Tool Co., Lafayette, Ind. Plain carbon and low-alloy steels are used. (J general, AY)

107-J. Special Gas-Fired Stress-Relieving Furnaces Used in Manufacture of Large Processing Equipment. *Industrial Heating,* v. 19, Mar. 1952, p. 462, 464, 466, 468, 470, 572-573.

Procedures and equipment at Wyatt Metal & Boiler Works in Houston and Dallas, Texas. Products include pressure vessels and other equipment for the petroleum industry, stainless steel and nickel items for the chemical industry, various types of tanks, towers, blast-furnace equipment, etc. (J1)

108-J. Close-Tolerance Steel Parts Austempered Without Distortion. John Kolb. *Iron Age,* v. 169, Apr. 3, 1952, p. 142-144.

Modified austempering process, using automatic, continuous salt baths and conveyer system worked out so that 4140 steel for rocket motors can be machined in the annealed condition before hardening. Each rocket motor body is subjected to 25,000-psi. hydrostatic tests, followed by final inspection for mechanical tolerances. (J26, AY)

109-J. Hardenability as the Criterion for Selecting Boron Steels. H. B. Knowlton. *Materials & Methods,* v. 35, Mar. 1952, p. 84-87.

Proper choice and use of boron steels depends to a great extent on understanding the effects of heat treating and case hardening on hardness, toughness, and fatigue properties. Data are charted. (J26, Q general, AY)

110-J. Tentative Hardenability Bands for New Boron Steels. *Materials & Methods,* v. 35, Mar. 1952, p. 123.

Tables and graphs. (J26, AY)

111-J. New Flame-Hardening Technique; Oxy-Town-Gas Heating With Automatic Control. *Metal Treatment and Drop Forging,* v. 19, Mar. 1952, p. 113-114.

Flame-hardening machine which can be developed in various designs for handling specific parts; also milliscope temperature-control mechanism. (J2, CN)

112-J. Induction Hardening of Crankshaft Journals; New Equipment Speeds Production at the Sheffield

Works of Ambrose Shardlow & Co. Ltd. Tom Bishop. *Metal Treatment and Drop Forging,* v. 19, Mar. 1952, p. 131-134.
(J2, ST)

113-J. Heat Treatment for Rope Wires. Richard Saxton. *Mining Magazine,* v. 86, Mar. 1952, p. 146-148.
The patenting process, cleaning and drawing operations, and mechanical test procedures.
(J25, F28, CN)

114-J. Closer Hardenability Control for Silicon-Chromium Steel. B. C. Schott and S. Isenberg. *Steel,* v. 130, Apr. 7, 1952, p. 114-115.
Various tests were run on experimental heats of Si-Cr valve steel. Results reveal that hardenability decreases as Si content increases. Photomicrographs, graphs, and tabbles. (J26, AY)

115-J. Dutch Reader Comments on "Influence of Microstructure on Heat Treating and Machining". W. J. van den Bergh. *Steel Processing,* v. 38, Mar. 1952, p. 139-140, 146-147.
Critical comments on article by Pliny J. Wilson (Nov. issue.) Discussion of the letter by Howard E. Boyer is also included.
(J general, M27, G17, ST)

116-J. Rohr Gets Accurate Temperature Control of Aluminum Alloys by Solution Heat Treating. W. H. Wynne. *Western Metals,* v. 10, Mar. 1952, p. 32-33.
Tables give recommended temperature range for solution heat treating of Al alloys, and suggested soaking time for solution treatment of wrought alloys (excluding forgings).
(J27, Al)

117-J. The Formation of Cracks During Heat Treatment of Tools. (In Russian.) A. P. Guliaev and S. P. Yakushev. *Stanki i Instrument,* v. 22, Aug. 1951, p. 26-27.
Data are charted and discussed.
(J general, TS)

118-J. Measurement of Case Depth. James Sorenson and Alfred Hendrickson. *American Machinist,* v. 96, Mar. 31, 1952, p. 129.
A table which can be used for establishing values for routine checking of carburized case depths on individual gears and similar parts after carburizing and hardening. (J28, CN, AY)

119-J. Metal Processing at Subzero Temperatures. G. B. Olson and H. T. Gregg, Jr. *Heating and Ventilating,* v. 49, Apr. 1952, p. 83-87.
Commercial equipment which is now available for producing temperatures as low as —200° F., has made possible an increased use of subzero temperatures for processing metals. Various applications of low temperature in this field. (J2)

120-J. Automotive Steering Gear Assemblies Present Heat Treating Problems. George Goepfert. *Industrial Gas,* v. 30, Mar. 1952, p. 13-15, 22-25, 27.
See abstract of "Production Heat Treatment of Ross Automatic Steering Assemblies", *Industrial Heating.* See item 106-J, 1952. (J general, AY)

121-J. Influence of Temperature, Gas Composition and Flow on Carbo-Nitrided Cases. W. H. Holcroft and D. J. Schwalm. *Metal Progress,* v. 61, Apr. 1952, p. 89-93.
Substantiates some of the theories of carbonitriding by reporting certain laboratory and production experiences. Deals with effect of NH_3 on case properties; of rate of flow; of CO-CO_2 equilibrium; and of temperatures above 1450° F.
(J28, ST)

122-J. Influence of Surface Condition on Quenching Rates. *Metal Progress,* v. 61, Apr. 1952, p. 162, 164, 166, 168, 170, 172. (Translated and condensed from "The Influence of Surface Conditions of Metals on the Cooling Rates in Liquid Quenchants", Walter Peter.)
Previously abstracted from *Archiv für das Eisenhüttenwesen.* See item 28-J, 1951. (J2, Fe)

123-J. Flame-Hardening; Use of Oxygen With Town's Gas in New German Process; Automatic Control of Heating and Quenching Cycle. *Aircraft Production,* v. 14, Apr. 1952, p. 144-146.
(J2)

124-J. This Furnace Processes These Parts. *American Machinist,* v. 96, Apr. 14, 1952, p. 139.
Versatility in heat treating method and work-size accommodation is required by Rockford Clutch Div., Borg-Warner Corp. By installing an Ipsen Industries automatic-cycle, controlled-atmosphere furnace, metal stampings and machined parts are carbonitrited up to 2½ times faster than the former method of liquid cyaniding. (J28, ST)

125-J. Gas—Key to Industrial Production and Metal Conservation. Charles C. Eeles. *Industrial Gas,* v. 30, Apr. 1952, p. 3-5, 25-36.
How precision gas heat treatment brings savings in steel tonnage; atmospheric furnaces add to savings; and modern forge heating minimizes waste.
(J general, F21, ST)

126-J. Continuous Heat Treating System for Cast Armor Plate Being

Installed. *Industrial Heating,* v. 19, Apr. 1952, p. 638, 650.

Automatic system in the new heat treating plant of General Steel Castings Corp., Eddystone, Pa. Continuous operation will be accomplished by using motor-driven flat-deck cars to transport the parts through a battery of heat treating furnaces. (J general, CI)

127-J. Water Sprays: How Effective Can They Be? W. P. Wallace and T. L. Newton. *Iron Age,* v. 169, Apr. 10, 1952, p. 121-123.

Effects of pressure, nozzle size, quantity of flow and droplet size on the cooling rates of water sprays. Specimens of 70-30 brass, heated to 1000° F. in an electric furnace, were quenched. Pressures in the circulating closed system varied from 0 to 100 psi. at an output of 90 gpm. Cooling curves were automatically recorded. (J2, Cu)

128-J. Continuous Carbon Restoration Furnace Boosts Production. J. D. Armour. *Iron Age,* v. 169, Apr. 17, 1952, p. 111-115.

New six-zone, continuous carbon restoring-annealing furnace at Union Drawn Wire Div. has increased production over batch methods 112-240% per invested dollar. Greater uniformity of surface carbon and shorter cycles have also been obtained and "scalloped" bars have been eliminated. The furnace handles bars up to 6 in. diam. and coils up to 54 in. diam. Atmosphere is controllable. (J23, ST)

129-J. Unique Line Hardens and Chills 16-Ft. Pieces. H. W. Dammel. *Iron Age,* v. 169, Apr. 17, 1952, p. 120-121.

New flame hardening machine and a special chilling unit which treats machine tool wear strips. This heat treating line has recently been completed at the Cincinnati Steel Treating Co. (J2, ST)

130-J. New Automatic Shaker Hearth Furnace for Fast Production of Small Parts—Cases From .001 to .003 Obtainable in From 1 to 5 Minutes. William F. Schleicher. *Machine and Tool Blue Book,* v. 48, Apr. 1952, p. 201-204, 206.

Equipment for hardening small steel tabs used in business machines with low distortion tolerances. (J28, ST)

131-J. How to Harden Small Steel Parts. Kenneth Rose. *Materials & Methods,* v. 35, Apr. 1952, p. 112-115.

Useful tips on ways to avoid precooling, prevent decarburization, and methods of conveying the work through the furnace. (J26, ST)

132-J. Temperature Controlled Flame Hardening. *Metallurgia,* v. 45, Mar. 1952, p. 135-137.

The Peddinghaus oxy-town-gas system for surface hardening of steel. (J2, CN)

133-J. The Function of Energizers in Pack Carburizing. Axel Hultgren. *Metallurgia,* v. 45, Mar. 1952, p. 149. (Translated and condensed from *Jernkontorets Annaler,* v. 135, No. 11, 1951, p. 575-604.)

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 202-J. 1951. (J28)

134-J. Electric Box-Type Furnace Increases Efficiency of Heat Treating Dental Forgings. *Modern Machine Shop,* v. 24, Apr. 1952, p. 250, 252, 254.

Brief account of furnace used at the S. S. White Dental Mfg. Co., Philadelphia. (J21, CN, SS)

135-J. Flame-Hardening of Locomotive Tyres. *Railway Gazette,* v. 96, Apr. 4, 1952, p. 376-377.

A semi-automatic plant for flame-hardening locomotive wheel flanges, a feature of which is the use of oxygen—town gas as the heating medium. A comparison between tire wear on normal and flame hardened tires is shown in diagrams. (J2, Q9)

136-J. Bright Annealing of Nickel and Its Alloys. H. J. Hartley and E. J. Bradbury. *Sheet Metal Industries,* v. 29, Apr. 1952, p. 337-341, 343.

See abstract from *Journal of the Institute of Metals;* item 80-J, 1952. (J23, Ni)

137-J. Flame Hardening With Oxy-Town Gas; Demonstration of Peddinghaus Equipment. *Sheet Metal Industries,* v. 29, Apr. 1952, p. 342-343. (J2, ST)

138-J. Some Notes on the Surface Hardening of Steels and the Use of Copper Plating for Stopping-Off. G. K. Burton. *Sheet Metal Industries,* v. 29, Apr. 1952, p. 367-368, 370. (J28, L17, ST, Cu)

139-J. Annealing Accelerated With Radiant Heat. Charles A. Turner, Jr. *Steel,* v. 130, Apr. 14, 1952, p. 106, 108, 111.

A continuous annealing method whereby tin-plate strip can be run at the rate of 1000 ft. per min. in direct-fired radiant gas heating equipment. Annealing can be a 90-sec. process. (J23, CN)

140-J. Pipe Weld Normalizing and Stress Relieving. C. A. Anderson, D. H. Corey and H. J. Denman. *Welding Journal,* v. 31, Apr. 1952, p. 324-329.

An improvement in the application of the 60-cycle induction heat-

ing method for normalizing and stress-relieving welded pipe joints; the metallurgical effects should not be changed by the electrical circuit changes described. Design computations and some of the lessons learned in the field. (J24, J1, Cu)

141-J. Production Non-Ferrous Wire Annealing at Bridgeport Brass. W. J. Krailing. *Wire and Wire Products,* v. 27. Apr. 1952. p. 370-371. 421.

A new idea in materials handling methods as applied to heat treating processes. How a leading manufacturer made more efficient use of existing facilities. (J23, A5, EG-a)

142-J. A Modern Electric-Furnace Heat Treatment Installation for Automobile Tools. (In French.) *Journal du Four Electrique et des Industries Electrochimiques,* v. 61, Jan.-Feb. 1952, p. 26-30.

Belgian factory performs, continuously and automatically, the following heat treatments: quenching or oil hardening of automobile tools and tempering of these tools. Photographs, micrographs, and tables. (J26, J29, ST)

143-J. Surface Hardening of Cast-Iron Guide Plates of Lathes. (In Russian.) G. R. Dobis. *Avtogennoe Delo,* v. 22, Aug. 1951, p. 23-26.

Flame hardening of critical surfaces of lathe beds. Equipment. Micrographs. (J2, CI)

144-J. Malleable Iron Annealing Time Reduced. W. G. Wilson and N. F. Tisdale, Jr. *American Foundrymen's Society,* Preprint, 52-41, 1952, 6 pages.

Addition of approximately 0.0015% B made it possible to reduce the annealing cycle markedly. Micrographs. (J23, CI)

145-J. Heat Treatment of Magnesium Alloy Castings. E. M. Gingerich. *American Foundrymen's Society,* Preprint 52-51, 1952, 8 pages.

Important phases of commercial heat treatment of Mg-alloy castings. Micrographs, macrographs, and tables. 10 ref. (J general, Mg)

146-J. Application of the Isothermal Transformation Diagram to the Normalizing of En 40C Steel. J. A. Cameron. *Journal of the Iron and Steel Institute,* v. 170, Apr. 1952, p. 313-320.

In reference to large forgings, evaluates Scheil's hypothesis in the pearlite range and Pumphrey and Jones' method for the bainite transformation. Tables and micrographs. 11 ref. (J24, N8, AY)

147-J. Heat-Treatment of Grey Cast Iron; Report and Recommendations of Sub-Committee T.S. 31. T. R. Twigger, chairman. *Proceedings of the Institute of British Foundrymen,* v. 44, 1951, p. A332-A339, disc., p. A339-A340.

Previously abstracted from *Institute of British Foundrymen;* item 210-J, 1951. (J general, CI)

148-J. Selection and Treatment of Die Steels. Part II. Stewart G. Fletcher. *Tool Engineer,* v. 28, May 1952, p. 52-54, 57.

Influence of heat treatment on die life; surface control in heat treatment; die design; and die-steel quality. (J general, T5, TS)

149-J. Rapid Tempering of High Speed Steel. *Journal of Metals,* v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 517-518.

Discussion of paper by A. E. Powers and J. F. Libsch. Item 259-J, 1951. (J29, TS)

150-J. Strength Properties of Flame Hardened Link Pins. (In German.) H. W. Gronegre. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, Mar. 11, 1952, p. 231-233.

Process was investigated as applied to steel pins or bolts. Graphs and tables show effects of variations in procedure on hardness, bend strength, impact strength, and durability. (J2, Q general, CN)

151-J. Advances in Induction Heating. John Parina, Jr. *Metal Progress,* v. 61, May 1952. p. 80-82.

Brief reports on the March 1952 meeting in Cleveland of the American Institute of Electrical Engineers for a conference on induction and dielectric heating. Covers 60-cycle heating for forging of nonferrous metals; induction heating for forging steel transmission gears; and selection of induction-heating equipment. (J2, F21)

152-J. Modern Designs of Malleablizing Furnaces. (In German.) K. Borchart. *Giesserei,* v. 39, Apr. 17, 1952, p. 171-179.

Batch-type furnaces. Chamber furnaces with horizontal charging by means of charging machine. Elevator-type furnaces with elevated furnace body and movable hearth carriage. Pusher-type malleablizing furnaces. Hood-type furnace with movable annealing hood and several bases. Diagrams and illustrations. (J23)

153-J. Bright Annealing of Steel Strip in Grunewald Type Furnace With Protective Gas, and Without

Water Cooling. (In German.) Hans Pannek. *Stahl und Eisen,* v. 72, Apr. 10, 1952, p. 423-425.

When using annealing ovens of Grunewald type, water cooling of the rubber seal has been necessary. This has certain drawbacks. Tests with seals more heat resistant than rubber, and with protective gas practically free of oxygen. A composite asbestos-rubber seal gave good results. Diagrams and tables. (J23, ST)

154-J. Determination of the Cooling Capacity of Quenching Baths. (In Italian.) Manlio Pesante. *Metallurgia Italiana,* v. 44, Apr. 1952, p. 145-152.

New electronic apparatus may be used to plot curves of cooling rate vs. temperature. Results of preliminary tests with different types of baths and media. (J26)

155-J. Study of the Carburization of SAE 3312 Steel in Molten Salts. (In Portuguese.) Alberto A. Arantes and Vicente Chiaverini. *Boletim da Associacao Brasilera de Metais,* v. 7, Oct. 1951, p. 447-468; disc., p. 469-470.

Influence of temperature of carburization and of time of treatment on characteristics of the carburized layer. Tables and graphs. (J28, J2, AY)

156-J. (Book) **Elements of Hardenability.** M. A. Grossmann. 164 pages. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $4.50.

Hardenability tests, nature of hardening, nature of the quenching process, and effects of alloying elements on hardenability. (J26, ST)

157-J. Pick the Right Type of Metal for Flame Hardening Meehanite Castings. C. R. Austin. *American Machinist,* v. 96, May 12, 1952, p. 165-169.

Test results involving mechanical properties, flame hardening data, and metallographic examination, to aid in selection of the different types of Meehanite metal. Photographs, micrographs, and graphs. (J2, Q general, M27, CI)

158-J. How to Case Harden Steel by Nitriding. John L. Everhart. *Materials & Methods,* v. 35, May 1952, p. 90-93.

The process, choice of steel, influencing factors, mechanical properties of the product, and applications. 10 ref. (J28, Q general, AY)

159-J. Precipitation Hardening Stainless Steels Show Advantages Over Standard Grades. Gordon T. Bedford. *Materials & Methods,* v. 35, May 1952, p. 99-104.

Properties of Armco 17-7 PH and 17-4 PH steels which can be readily cold or hot worked and welded, and with proper heat treatment, develop strengths equaling those of the carbon and low-alloy steels at room temperature. Miscellaneous physical, mechanical, and fabrication properties. Heat treatment and welding sequence effects. Extensive tabular data. (J27, P general, Q general, SS)

160-J. Heat Treating Boron Steels; Machinability Can Be Improved. J. D. Graham. *Steel,* v. 130, May 12, 1952, p. 94-96.

Heat treatment, hardness, and microstructure as they apply to machinability. Graphs show transformation, hardenability range. (J general, N8, G17, AY)

161-J. Narrow Strip Mills Employ Single-Stack Annealing Furnace. *Steel,* v. 130, May 12, 1952, p. 98.

Furnace with high-convection gas circulating systems, high heat inputs, alloy inner covers and oil-sealed bases, widely adopted by the narrow strip industry. (J23, ST)

162-J. Practical Aspects of Tool and Die Heat Treatment. Edward J. Pavesic. *Steel Processing,* v. 38, May 1952, p. 240-243.

A discussion to aid the tool engineer. Selection of material, tool design, and heat treating practice. (J general, TS)

163-J. New Electron Diffraction Studies of the Carburizing of Iron. (In French.) Jean-Jacques Trillat and Shigeo Oketani. *Revue de Métallurgie,* Apr. 1952, p. 262-266; disc., p. 266.

A technique consisting of vacuum deposition of very thin films of Fe on a support of NaCl; the support is dissolved in water and the film of Fe is subjected to carburizing in the presence of Co or a $Co+H_2$ mixture. The films are examined by electron diffraction, making it possible to study the kinetics of surface reactions which accompany carburization and to identify different phases formed. Diffraction patterns, diagrams, and tables. (J28, M21, Fe, ST)

164-J. Induction Hardening of Malleable Iron. (In German.) A. Rühenbeck. *Giesserei,* v. 39, Mar. 6, 1952, p. 103-107.

Advantages and characteristics of above. Graphs, tables, macrographs, and micrographs. (J2, CI)

165-J. General Features of Radio-Frequency Heating and Its Industrial Applications. M. G. Favre. *Brown Boveri Review,* v. 38, Nov. 1951, p. 317-319.

Advantages and possible applications of induction heating of metals and dielectric heating of insulating

materials. Different factors determining production costs were investigated. (J2)

166-J. Radio-Frequency Heating Equipment. Brown Boveri. **Radio-Frequency Generators for Industrial Applications.** M. G. Favre. **Work-Handling Equipment for Radio-Frequency Heaters.** E. Guyer. *Brown Boveri Review,* v. 38, Nov. 1951, p. 320-330.

Includes circuit diagrams and illustrations. (J2)

167-J. The Radio-Frequency Heating of Metals. Power Required for the Radio-Frequency Heating of Metals. Radio-Frequency Hardening of Steel. A. Leemann. **Soldering, Annealing, Melting, and Sintering With Radio-Frequency Heating Equipment.** G. Küchli. *Brown Boveri Review,* v. 38, Nov. 1951, p. 331-343.

First article contains formulas and diagrams for determining heating energy required for induction heating of metallic parts and for ascertaining loss of heat due to radiation and convection. Second article: Various methods of operation usually employed in r.f. heating. Last article: Application of r.f. power to soldering, annealing, melting, and sintering. (J2, ST)

168-J. Theoretical Aspects of Radio-Frequency Heating. The Principles of Induction Heating. E. Simmen. **Radio-Frequency Case-Hardening—the Problem of Heat Conduction.** A. Leemann. **Fundamental Theory of the Radio-Frequency Heating of Insulating Materials.** E. Simmen. *Brown Boveri Review,* v. 38, Nov. 1951, p. 361-371.

Includes diagrams and graphs. 20 ref. (J2)

169-J. Hardening Tank Tread Links in Quantity in Batch Furnaces. George Brailsford. *Industrial Heating,* v. 19, May 1952, p. 798-800, 802, 804.

Use of a battery of standard batch-type full-muffle gas-fired hardening furnaces and forced convection draw furnaces. Hardening and drawing operations for the links which are made of SAE 1035 and 8640 steel. (J26, CN, AY)

170-J. Boron Steels: Applications and Characteristics. *Machine and Tool Blue Book,* v. 48, June 1952, p. 166-168, 170, 172, 174-176, 178, 180.

Reviews boron steels from the point of view of several commercial users. Hardenability ranges are charted. Tables show new steels developed to conserve Ni and Mo and present SAE steels vs. alternate steels for a series of applications. (J28, S22, T general, AY)

171-J. Heat Treatment Plant Developments. Recent Installations for Ferrous and Non-Ferrous Metals. *Metallurgia,* v. 45, May 1952, p. 231-245.

Reheating furnaces; annealing furnaces; annealing of malleable castings; hardening and tempering furnaces; gas carburizing equipment; salt baths; and exfoliation of vermiculite. (J general)

172-J. Isothermal - Transformation Tempering. *Metal Treatment and Drop Forging,* v. 19, May 1952, p. 204. (Translated and condensed from article by E. Theis.)

Previously abstracted from *Stahl und Eisen.* See item 64-J, 1952. (J23, N8, AY)

173-J. Tyce Engineering Speeds Stainless Parts Production by Versatility and Know-How. *Western Metals,* v. 10, May 1952, p. 38.

Heat treating facilities for aircraft parts. (J general, SS)

174-J. Preheat vs. Low and High-Temperature Stress-Relief Treatments. E. Paul DeGarmo. *Welding Journal,* v. 31, May 1952, p. 233s-237s.

Bend-test results on large carbon steel plate specimens designed to give a direct comparison of preheat, low-temperature stress-relief and postwelding heat treatment at 1200° F. Graphs, micrographs, and macrographs. (J1, CN)

175-J. The Influence of Heat Treatment on the Strength Characteristics and the Structure of Steel Wire. J. Billigmann. *Draht* (Wire) (English Ed.), Dec. 1951, p. 28-33.

The most suitable heat treatment conditions for steel wire of low, medium, and high carbon contents to obtain suitable strength properties and favorable structures. Graphs, tables, and micrographs. (J general, Q23, M27, ST)

176-J. The Bright Annealing of Wire in Vacuum Furnaces Without the Use of Inert Gas. H. Kalpers. *Draht* (Wire) (English Ed.), Dec. 1951, p. 37-38. (J23)

177-J. Protective Gases for the Heat Treatment of Steels. (In German.) Ernst Kunze. *Stahl und Eisen,* v. 72, May 8, 1952, p. 561-569.

Survey of literature relating to the physical-chemical fundamentals, types, industrial production, and application of protective gases. Use of C-O_2-H_2 diagram for assessing suitability of protective gases for certain steels. Tables, graphs, and diagrams. (J2, ST)

178-J. Equipment for Inductive Surface Hardening. (In German.) K. Kegel. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, Apr. 21, 1952, p. 331-338.

A survey, including practical application problems. 14 ref. (J2)

179-J. The Problem of Controlling Heat Treating Furnaces. (In Russian.) L. A. Klein. *Za Ekonomiiu Topliva,* v. 9, Feb. 1952, p. 30-36.

The planning of work per shift and per working stand in relation to fuel consumption and capacity of the furnaces. Data are tabulated and charted. (J general)

180-J. Precision Process for Rail-End Hardening. *Railway Engineering and Maintenance,* v. 48, June 1952, p. 576.

New process now being employed by Colorado Fuel & Iron Corp., Pueblo, Colo., for obtaining uniformity of pattern, location, and hardness. It employs a series of Selas radiant burners under which the rail ends pass on a hydraulic conveyor system. (J26, CN)

181-J. The Fabrication of Chromium-Molybdenum Steel Piping for 1000 to 1050° F. Central Station Service. R. W. Emerson. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 869-887; disc., p. 887-894.

Certain metallurgical characteristics of the low-carbon Cr-Mo alloys indicate the possibilities of heat treating such material to a wide range of mechanical properties, depending upon the type of heat treatment specified. Factors pertinent in heat treatment of alloy steel piping to obtain good high-temperature properties. Several specific questions are raised relative to heat treatment for obtaining best high-temperature properties at 1000 and 1050° F. Structural stability of the 2¼% Cr, 1% Mo alloy, together with impact-test data both before and after 2000 hr. at 1050 and 1150° F. The welding of this steel.
(J general, K9, Q general, AY)

182-J. Annealing Instrument Cases. K. I. Robinson. *Industrial Gas,* v. 30, June 1952, p. 6-7, 22-23.

Furnace in operation at C. B. Kaupp & Sons can be used for annealing Al, brass and Cu, Monel, Inconel, and stainless steels.
(J23, Al, Cu, Ni, SS)

183-J. New Developments in Rapid Heating for Industrial Processing. Frederic O. Hess. *Industrial Gas,* v. 30, June 1952, p. 9-12, 24.

Some examples of metallurgical interest: surface hardening of steel; short-cycle normalizing of welded steel tubing; and heat treatment of high-strength steel casing.
(J general, ST)

184-J. Heat Treating: Carbon Restoration Furnace Used to Improve Screws, Bolts. *Iron Age,* v. 169, June 19, 1952, p. 171.

Carbon was restored on 0.35% C steel stock depleted to depths of 0.006-0.007 in. (J28, CN)

185-J. Production Problems. XVI. Quenching of Needle Wire. *Iron & Steel,* v. 25, June 1952, p. 297-298.

A metallurgical investigation to determine the cause of cracking of quenched steel needle wire. Possible causes are quenching, hardness, composition, and flaw factors. Tables and micrographs. (J26, CN)

186-J. A New Gear Production and Heat Treatment Installation. *Machinery* (London), v. 80, June 5, 1952, p. 998-1002.

Installation at Blaw Knox, Ltd., London. (J26, G17)

187-J. Production Heat Treating of Connecting Rods. Herbert Chase. *Materials & Methods,* v. 35, June 1952, p. 100-101.

How high output is maintained by using a continuous furnace, caustic soda quench, and recirculating draw furnace. (J26, ST)

188-J. Forgeability, Machinability and Hardenability of Boron Carburizing Steels. S. L. Widring and Wilson T. Groves. *Metal Progress,* v. 67, June 1952, p. 71-76.

Details of experience of Spicer Mfg. Div., Dana Corp., Toledo, Ohio, in use of modified boron steels for carburized gears and shafts. Data are charted and tabulated.
(J26, F22, G17, AY)

189-J. Martempering and Slack Quenching. *Metal Progress,* v. 67, June 1952, p. 90-91.

Use of molten-salt interrupted quenching of toolsteel parts at Ingersoll-Rand, Phillipsburg, N. J.
(J26, TS)

190-J. Heat Treating, Setting and Shot-Peening of Mechanical Springs. F. P. Zimmerli. *Metal Progress,* v. 67, June 1952, p. 97-106.

Second portion of 1951 William Park Woodside Lecture to Detroit Chapter, ASM. Data for both ferrous and nonferrous alloys. Tables, graphs, and diagrams.
(J general, G23)

191-J. Practical Aspects of Tool and Die Heat Treatment. Edward J. Pavesic. *Metal Treating,* v. 3, May-June 1952, p. 4-7.

See abstract, *Steel Processing,* item 162-J, 1952. (J general, TS)

192-J. This Russian-Built Copy of Caterpillar's D7 Tractor Shows Russ Packs Engineering Punch. *SAE Journal,* v. 60, June 1952, p. 17-21. (Based on "The Stalinetz 80 Tractor—A Sober-

ing Example of Soviet Russia's Engineering Competence," by J. M. Davies.)

See abstract of "Russian Tractors Show Sound Engineering", *Iron Age,* v. 169, June 5, 1952, p. 150-152. (J, E, G)

193-J. Giant Tongs Expedite Turret Handling. *Steel,* v. 130, June 23, 1952, p. 80.

Two pairs of tongs are used, one for lifting turrets after heating for hardening and the second for tempering reheat. Remote control is said to eliminate worker hazard and increase production. (J general, A5)

194-J. Boron Saves the Day. Richard Cheney. *Steelways,* v. 8, May 1952, p. 4-7.

Use of B in improving the hardenability of steel and comparison to Ni and Mo. (J26, AY)

195-J. (German.) **Thermotechnical Research on Flame Hardening.** Georg Wagener. *Gas- und Wasserfach,* v. 93, May 15, 1952, p. 225-228.

Comparative studies of effects of slow and sudden heating on temperature gradients of steel heated in a furnace and by a gas flame. Photographs, graphs, and tables. (J2)

196-J. Fairfield's New Gear Plant. Joseph Geschelin. *Automotive Industries,* v. 107, July 1, 1952, p. 50-53.

Heat-treating facilities include a continuous gas-carburizing furnace of radiant-tube type, and a newly developed cycle-annealing furnace of 2-row, pusher type. (J23, J28, ST)

197-J. A Study of the Annealing Kinetics in Cold Worked Copper. Dwain Bowen, R. R. Eggleston, and R. H. Kropschot. *Journal of Applied Physics,* v. 23, June 1952, p. 630-634.

Resoftening kinetics for cold work in Cu were studied using residual resistance as a measure of degree of recovery. It was found that the resoftening could be represented by a single process of activation energy 28.3 kcal. per mole. The complete annealing kinetics are described by a 4th-order reaction. Graphs. (J23, Cu)

198-J. Migration of Copper Plating in Box Carburizing. T. W. Ruffle and P. M. H. Chawner. *Metal Treatment and Drop Forging,* v. 19, June 1952, p. 245-250, 254.

Carburizing difficulties that arise near Cu-plated, "stopped-off" zones of steel components. Photographs and photomicrographs. (J28, Cu, ST)

199-J. Heat-Treatment of Steel Gears. *Metal Treatment and Dorp Forging,* v. 19, June 1952, p. 251-254.

New heat treatment shop at the Rochester works of Blaw Knox Ltd., for treatment of steel gears and shafts. (J general, ST)

200-J. (French.) **The Influence of Gas Adsorption on the Surface Hardening of Beryllium Bronze, Annealed After Hardening.** Hubert Forestier and Joseph Maurer. *Comptes Rendus hebdomadaires des Séances de l'Academie des Sciences,* v. 234, May 26, 1952, p. 2196-2198.

Results of experiments. H_2, A, and CO_2 were used as atmospheres. Their adsorption on the surface of the crystal lattice caused a variation in rate of transformation of a non-equilibrium state, corresponding to precipitation in a supersaturated alloy after annealing. (J2, N7, Cu)

201-J. (French.) **Thermal Treatment of Metals; Application of Salt Baths.** *Métallurgie et la Construction mécanique,* v. 84, May 1952, p. 321, 323, 325-326.

Reviews recent progress, as applied to steel. Tables give extensive data concerning salt-bath compositions for different heat treatments and different steels. Heat treatment cycles are also tabulated. (J2, ST)

202-J. (German.) **Influence of Size, Preliminary Treatment, and Hardening Agents on the Hardening of Unalloyed Tool Steels.** Erich Theis. *Archiv für das Eisenhuttenwesen,* v. 23, Mar./Apr. 1952, p. 113-118; disc., p. 118.

Investigated for toolsteels containing 0.6-1.0% C, 0.2-0.6% Mn, and 0.1-0.2% Cr. Influence of the various factors; optimum size and treatment for test pieces. Data are charted. (J26, TS)

203-J. The Annealing and Heat Treatment of Ductile Cast Iron. C. C. Hodgson and W. Fairhurst. *Metallurgia,* v. 45, June 1952, p. 283-288, 296.

Investigation undertaken to determine the relationship between thermal treatments applied to ductile cast iron and its structure and mechanical properties. The treatments comprise annealing to improve machinability or develop maximum ductility and toughness, hardening, and tempering. Effects of Mn and Si content. Photomicrographs, diagrams, and tables. (J general, Q general, G17, CI)

204-J. A Modern Heat Treatment Plant: Wild-Barfield Installations at Blaw-Knox, Ltd. *Metallurgia,* v. 45, June 1952, p. 297-298.

Facilities and operations at above British plant. A variety of case hardening steels are treated. (J general, CN, AY)

205-J. Residual Stresses in Springs. O. B. Meyers. *Product Engineering,*

v. 23, July 1952, p. 148-149.

Control by stress-relief and cold setting, with some information for a variety of spring metals and types. Diagrams and graph. (J1, Q25, SG-b)

206-J. Direct Resistance Heating. Lewis B. Reed. *Steel,* v. 131, July 14, 1952, p. 86-87.

Examples of use are annealing Cu tubing and spring steel strip, and upsetting of steel rod. (J2, J23, F21, Cu, ST)

207-J. High Chromium Stainless as a Substitute for 18-9. Part I. Heat Treating, Forging, Pressworking. Lester F. Spencer. *Steel Processing,* v. 38, June 1952, p. 288-294, 298.

Type 430 stainless steel, its chemical composition and typical physical and mechanical properties as compared with Type 302. Procedure for heat treating, forging, and pressworking of Type 430. Includes pickling and scale removal. Tables, photomicrographs. (To be continued.) (J general, F22. G1, SS)

208-J. Induction Hardened Gears Show Little Distortion. L. G. Miller. *American Machinist,* v. 96, July 21, 1952, p. 141.

Procedures of Greenlee Bros. & Co. for induction hardening a variety of Cr-Mo steel gears. Method of minimizing distortion. (J2, AY)

209-J. Annealing Large Caliber Steel Cartridge Cases. *Industrial Heating,* v. 19, July 1952, p. 1194-1198, 1210.

Special annealing process in operation at Ekco Products Co., Massillon, Ohio, used in the manufacture of steel cartridge cases. Photographs and diagrams. (J23, ST)

210-J. Heat Treatment of Titanium-Rich Titanium-Iron Alloys. H. W. Worner. *Industrial Heating,* v. 19, July 1952, p. 1200, 1202, 1204, 1206, 1208, 1210.

See abstract from *Journal of the Institute of Metals;* item 55-J, 1952. (J26, J27, Ti)

211-J. Prediction of End-Quench Hardness in Steels Simplified. M. A. Orehoski and J. M. Hodge. *Iron Age,* v. 170, July 17, 1952, p. 125-129.

Improved method for estimating Jominy end-quench curve from the first 1/16 in. to the region of 50% martensite. The method is not too accurate for boron steels. Numerous graphs and tables. (J26, ST)

212-J. Precipitation Hardening of Hot Working and High Speed Steels. Kehsin Kuo. *Research,* v. 5, July 1952, p. 339-340.

A study of the carbide reactions which occur during tempering of molybdenum and tungsten steels. (J27, J29, TS)

213-J. (Dutch.) **Carburization and Decarburization of Steel in an Artificial Atmosphere.** C. H. Luiten. *Smit Mededelingen,* v. 7, Apr.-June 1952, p. 59-63.

Shows that above is governed by chemical reactions of gases around the steel, that rate control depends on the velocity of different gas reactions, and that "carbon pressure" is controlled by certain interdependent gas ratios. Includes graphs. (J2, J28, ST)

214-J. (German.) **Induction Heating Equipment.** W. Stuhlmann. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, July 1, 1952, p. 653-654.

Equipment for shaping, hardening melting of hard solder, and for drying. (J2, K7, L26)

215-J. (Russian.) **The Thermal Effect of the Process of Natural Aging of Al-Cu Alloys (5% Cu) After Hardening and Recovery.** S. M. Skuratov and N. S. Podol'skaia. *Zhurnal Obshchei Khimii,* v. 22 (84), Jan. 1952, p. 31-38.

The thermal effects were studied in a specially prepared alloy. Specimens were hardened at 19.2 and 26.0° C. Data are tabulated. (J27, Al)

216-J. Austempered Lawnmower Blades Are Hard, Tough. W. G. Patton. *Iron Age,* v. 170, July 31, 1952, p. 88-90.

Manufacture of the blades, especially heat treating operations. Hardening temperature of SAE 1060 and 1070 blades is 1550-1600° F.; transformation temperature is 600° F.; salt-bath installation is completely conveyerized. (J26, CN)

217-J. How to Set Up a Heat Treating Department. W. G. Patton. *Iron Age,* v. 170, Aug. 7, 1952, p. 109-113.

Equipment and procedures of Teer, Wickwire & Co., Jackson, Mich. Some 150-175 tons of kingpins, aircraft-valve rocker arms, track link pins, hydraulic ram assemblies and other critical parts are treated. Included in basic equipment are two Homo-Carb furnaces, three salt baths, a tempering furnace, oil and caustic quench baths, and a cooling tower. Automatic controls, recording equipment, and special handling devices are built in. Results on carbon and alloy steels. (J general, CN, AY)

218-J. The Rapid Softening of Cold-Drawn Austenitic Stainless Steels. F. A. Hodierne and C. E. Homer. *Journal of the Iron and Steel Institute,* v. 171, July 1952, p. 249-253.

A detailed study of the effects of softening treatment on properties and structure of five different stain-

less steels. Includes corrosion resistance, hardness and microstructure. Recommended conditions for rapid softening.
(J29, M27, Q29, R general, SS)

219-J. Value of Furnace Research Shown at Electric Furnace. C. L. West. *Steel Processing,* v. 38, July 1952, p. 344-350.

The research department begun in 1931 at the Electric Furnace Co., Salem, Ohio, has proven very valuable in its constant study of materials for furnace construction, determining temperatures, cycles and furnace atmosphere required in the heat treatment of metal products. Studies have also indicated the most suitable design and size of furnace and gas-atmosphere equipment for specific production requirements.
(J general)

220-J. Heat-Treating and Machining of Boron Steels. Part I. J. D. Graham. *Tool Engineer,* v. 29, July 1952, p. 46-48; Aug. 1952, p. 58-60.

Machining as related to heat treatment and isothermal transformation. Tables and graphs.
(J26, G17, AY)

221-J. How to Cool Oil-Quench Tanks. C. L. Ringquist. *American Machinist,* v. 96, Aug. 18, 1952, p. 106-108.

Description and detailed diagrams of four typical cooling systems for controlling quench-oil temperature.
(J2)

222-J. Better Heat Treating Born in Research. C. L. West. *Iron Age,* v. 170, Aug. 14, 1952, p. 134-136.

Previously abstracted from *Steel Processing,* item 219-J, 1952.
(J general)

223-J. Isothermal Heat Treatment of Meehanite Metal. C. R. Austin. *Metal Progress,* v. 62, Aug. 1952, p. 109-112.

Establishment of S-curve of Meehanite. From the results, selected heat treatments were recommended for investigation on effects of interrupted quenching treatments in terms of both Brinell hardness and tensile strength of the heat treated irons. Jominy end-quench data obtained after austenitizing at 1560 and 1785° F. show effect of maximum temperature of heating on hardenability. Data are compared with those for high-Si spring steels.
(J26, N8, CI, AY, SG-b)

224-J. Hevi Duty Shaker Hearth Furnace. *Metal Treating,* v. 3, July-Aug. 1952, p. 3-4.

Commercial equipment designed for production of exacting physical properties in small parts. (J general)

225-J. A Successful Method of Heat Treating Water Hardening Forging Dies. Horace C. Knerr. *Metal Treating.* v. 3, July-Aug. 1952, p. 18.

Equipment and procedure. Diagrams. (J26, TS)

226-J. Flame Hardening Turret-Ring Ball Races. B. A. Schevo and Z. J. Fabrykowski. *Welding Journal,* v. 31. Aug. 1952, p. 699-703.

Fixture and process for successfully flame hardening FS4140 steel ball races of vehicular turret rings in vertical position developed at Detroit Arsenal. Tables, diagrams, and illustrations. (J2, AY)

227-J. Kidde Boosts Cylinder Production With Automatic Heat Treating Equipment. V. J. Hill. *Industrial Heating,* v. 19, Aug. 1952, p. 1390-1392, 1394, 1396, 1398.

Equipment and procedures of Walter Kidde & Co., Belleville, N. J., for production of steel cylinders for compressed gases, etc. Diagram and illustrations. (J general, ST)

228-J. Axle Shaft Flanges Annealed in Liquid Bath Furnaces. John Kremer. *Industrial Heating,* v. 19, Aug. 1952, p. 1400, 1402, 1404, 1536.

Equipment and procedures of Eaton Mfg. Co.'s Axle Div., Cleveland. Materials are alloy steels of the 4100 and 4300 series. (J23, AY)

229-J. Electric Furnace Company Expands Research Facilities. C. L. West. *Industrial Heating,* v. 19, Aug. 1952, p. 1414, 1416, 1418, 1420, 1422, 1424, 1426, 1428, 1430, 1432, 1536.

Previously abstracted from *Steel Processing.* See item 219-J, 1952.
(J general)

230-J. Annealing for Narrow Strip Mills. J. L. Whitten. *Iron and Steel Engineer,* v. 29, Aug. 1952, p. 84-90; disc. p. 90-91.

Shows how extensively the narrow strip industry has adopted the most modern conception of annealing design in single-stack furnaces with high convection gas-circulating systems, high heat inputs, alloy inner covers, and oil-sealed bases. Diagrams and illustrations. (J23, ST)

231-J. Decarburization. J. Lomas. *Machinery Lloyd* (Overseas Ed.), v. 24, Aug. 2, 1952, p. 110-111, 113-114.

The loss of carbon from the surface of a steel or steel part, which occurs when it is heated in an oxidizing atmosphere, and results in reduced hardness of the surface. Causes and means of minimization.
(J28, ST)

232-J. One Way to Increase Heat Treating Furnace Efficiency. Frank Panlener. *Materials & Methods,* v. 36, Aug. 1952, p. 106-107.

By redesign of fixtures, Heat Treating Dept., Nash Motors Div.,

reduced dead weight and increased effective capacity of a gas carburizing furnace without overloading it. (J28)

233-J. (German.) **Structure and Hardenability of Copper-Manganese-Silicon Alloys.** K. L. Dreyer. *Metall,* v. 6, Aug. 1952, p. 440-444.

The behavior of Cu-Mn-Si alloys on the basis of the literature. Experiments with alloys containing 1 and 2% Mn, and 2-5% Si. (J26, M27, Cu)

234-J. Mechanism of the Carburization of Some Stainless Steels. J. B. Giacobbe. *American Society for Metals,* Preprint 3, 1952, 15 pages.

A theory of carburization of alloy steels postulates that pure, solid carbon cannot supply soluble or diffusible carbon to the metal surface. An "oxidizing potential" created by CO_2 or water vapor must exist in order that nascent carbon may be generated as a result of the formation and subsequent dissociation of CO. It is shown that certain 18-8 austenitic stainless steels can absorb carbon from high-purity graphite under a vacuum of the order of 10^{-4} mm Hg. Under these conditions, it is believed that the gaseous phase or "oxidizing potential" plays a minor role in the mechanism of carburization. On the other hand, contact pressure between the solid carburizer and the metal surface exerts a pronounced influence on rate of carburization; the higher the pressure, the greater the C absorption. This is explained on the basis of "contact catalysis." (J28, SS)

235-J. The Effect of Silicon on the Tempering of Martensite. A. G. Allten and P. Payson. *American Society for Metals,* Preprint 10, 1952, 28 pages.

Evidence that Si affects hardness during tempering of 0.6% C and 0.4% C+3% Ni steels which contained up to 2.2% Si. Hardness, dilatometric, specific volume, electrical resistivity, and X-ray diffraction measurements were used. Results demonstrate that the temperature at which cementite forms, on heating of martensite at a definite rate, is raised in relation to Si content. Notch-impact properties of the tempered steels were affected by the presence of Si. 13 ref. (J1, Q6, N8, CN, AY)

236-J. The Mechanism and Kinetics of the First Stage of Tempering. C. S. Roberts, B. L. Averbach, and Morris Cohen. *American Society for Metals,* Preprint 11, 1952, 24 pages.

Studied by means of X-ray and length measurements on a series of high purity Fe-C alloys and commercial steels. A single-crystal X-ray technique was employed to ascertain changes in the martensitic matrix attending rejection of carbon. Kinetics of the retained austenite transformation in the 2d stage of tempering are reported in an appendix. (J1, N8, Fe, ST)

237-J. An End-Quench Test for Determining the Hardenability of Carburized Steels. F. X. Kayser, R. F. Thomson, and A. L. Boegehold. *American Society for Metals,* Preprint 13, 1952, 17 pages.

A new type of end-quench bar developed specifically for measuring the hardenability of case treated steels is called the trapezoidal bar. It was designed so that hardness impressions can be made at any point in the case or in the core over the entire quenched length of the bar without the necessity of grinding. Hardness impressions are made perpendicular to the concentration gradient, and hardenability results are directly comparable to those obtained by using a standard Jominy bar. Data from experimental work in measuring hardenability of grades of carburizing steels indicate that case hardenability of boron steels goes through a maximum at about 0.70% C. (J26, CN, AY)

238-J. The Influence of Boron on Case Hardenability in Alloy Carburizing Steels. C. F. Jatczak and E. S. Rowland. *American Society for Metals,* Preprint 14, 1952, 13 pages.

The carburized end-quench test was used to evaluate the effect of boron on case hardenability of 80B20, 94V20, 94B20, and 47B20 containing 0.60-1.0% C for several heat treating conditions. (J28, AY)

239-J. Effect of Carbon Content on 18-4-1 High Speed Steel. Arthur H. Grobe and George A. Roberts. *American Society for Metals,* Preprint 15, 1952, 17 pages.

Complete hardness data, for hardening and tempering, are reported for five 18-4-1 high speed steels with C contents varying from 0.52 to 0.78% and one steel with 0.57% C and 1.21% V. The steels were austenitized for 0.1-300 min. at 1800-2350° F. Data on effect of austenitizing time and temperature on oil quenched hardness are presented as iso-hardness lines on time-temperature plots for each steel. Tempering data are recorded as master tempering curves where hardness is plotted against tempering parameter for each austenitizing temperature

for every steel. Unnotched Izod impact tests were made using five steels oil quenched from 2200° F. and three steels from 2350° F. (J22, Q29, TS)

240-J. The Effect of Quenching and Tempering on Residual Stresses in Manganese Oil Hardening Tool Steel. Harold Jack Snyder. *American Society for Metals,* Preprint 21, 1952, 12 pages.

Data indicate that the principal quenching stresses in a fully hardened flat specimen are tensile, equal in all surface directions, and concentrated within a surface layer 0.025 in. thick. A tempering treatment progressively decreases these surface stresses until they become negligible or slightly compressive, but does not affect depth of penetration. Effects of etching, lapping, and grinding on residual stresses in the same steel were also investigated. 17 ref. (J29, Q25, TS)

241-J. What Temper Is Best for Insulated Aluminum Conductors? Joel Tompkins. *Electrical World,* v. 138, Sept. 8, 1952, p. 120-122.

Heat-cycle tests at Electrical Conductor Laboratory of Aluminum Co. of America show advantages of intermediate temper for best over-all "connectibility" characteristics for insulated Al wire and cable. (J27, T1, Al)

242-J. Equipment for the Thermal Treatment of Non-Ferrous Metals and Alloys. *Journal of the Institute of Metals,* v. 80, Aug. 1952, p. 667-681.

Joint discussion of seven papers published in v. 80, p. 255-339. See items 77-J through 83-J, 1952. (J general, EG-a)

243-J. What Price Hardenability? Harry M. McQuaid. *Metal Progress,* v. 62, Sept. 1952, p. 88-96.

Considers various types of alloy steel with respect to hardenability, and application in automotive parts. Advantages of Cr-V steels, use of straight Cr steel, economic criteria for use of Cr and Mn, and increased use of Mo in alloy steels. (J26, T21, AY)

244-J. Use Care in Heat Treating Austenitic Alloys. *Steel Processing,* v. 38, Aug. 1952, p. 387.

Metallurgical research at laboratories of the Superior Tube Co., has reaffirmed the re-emphasized five major danger areas which must be watched during the heat treating of austenitic stainless steels. (J general, SS)

245-J. (French.) **Improvements and Saving of Steels in Quench Hardening.** Manlio Pesante. 4th International Mechanical Engineering Congress, June 1952, 23 pages.

The quenching phenomenon; its effect on steel structural changes; and the so-called cooling power of quenching baths. Conditions to be fulfilled by the bath. An instrument which automatically records the quenching curve while quenching progresses. Graph characterizes cooling power of the bath. (J2, J26, ST)

246-J. (French.) **A Furnace for the Stabilization of Castings.** Georges Ulmer. *Fonderie,* July 1952, p. 2999-3006.

Furnace used for stress-relief annealing of castings. Dimensions, construction, and operation. Results of experiments. (J1)

247-J. (German.) **Influence of Annealing and of Nitrogen on Properties of Electric Arc Welds.** Fr. Gentner. *Brennstoff-Wärme-Kraft,* v. 4, Aug. 1952, p. 275-279.

Welds in boiler construction. Compares the properties of unannealed welds with those annealed without stresses and with air-quenched welds. Proposes an explanation for the differences noted. (J23, K1, ST)

248-J. Toolroom Heat-Treating Equipment. *American Machinist,* v. 96, Sept. 15, 1952, p. 169, 171, 173.

A condensed description of various types. Includes rating chart for toolroom furnaces. (J general)

249-J. Electrode Salt Baths. *Iron & Steel,* v. 25, Sept. 1952, p. 413-415.

Production and toolroom models of salt baths, used for various heat treatment processes. (J2)

250-J. Heat Treating Austenitic Alloys. *Screw Machine Engineering,* v. 13, Sept. 1952, p. 63.

Recommendations for Series 300 stainless steels. (J general, SS)

251-J. Efficient Heat Treating of Large Transmission Parts. E. R. Peterson. *Automotive Industries,* v. 107, Sept. 15, 1952, p. 38-40.

Layout plan of heat treating department in transmissions operations of the Allison Division, General Motors Corp. (J general, ST)

252-J. The Theory & Practice of Nitriding. *Chemical Age,* v. 67, Sept. 6, 1952, p. 329-331.

Case hardening of special steels with nitrogen. (J28, ST)

253-J. Factors Influencing Pack Carburising. E. Mitchell. *Metallurgia,* v. 46, Aug. 1952, p. 61-72.

A series of tests to establish the effect of various factors, including temperature and amount and type of energizer, on nature of case obtained with both plain carbon and alloy case-hardening steels. Effect

of dilution of carburizing compound, and a suggestion for a compound which will prevent formation of heavy carbide networks normally associated with heavily alloyed case hardening steels. Other factors influencing commercial pack carburizing process. Numerous photomicrographs of structure and tables. (J28, M27, CN, AY)

254-J. (Japanese.) **Quenching and Tempering of β-Tin Bronze.** Yoshikazu Hosoi. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 16, Jan. 1952, p. 42-46.

Detailed experiments by means of electric resistance, hardness, and microscopic analyses. Tables, graphs, and micrographs. (J26, J29, M27, P15, Q29, Cu)

255-J. (Japanese.) **Heat Treatment and Rate of Deformation of Various Different Punching-Die Steels.** Sadao Koshiba and Sukeo Nagashima. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 16, Jan. 1952, p. 56-60.

Hardness and rate of deformation due to heat treatment of various different punching-die steels was studied. Results are charted and tabulated. (J general, Q29, TS)

256-J. Low Frequency Induction Heating. H. N. Acker. *Canadian Metals,* v. 15, Sept. 1952, p. 22, 24.

Heating for forging of grinding balls and automotive parts; extrusion of nonferrous alloys; tempering of components prior to drawing; 1000-cycle induction heating for ferrous and nonferrous melting furnaces. (J2, F22, F24, J29, E10)

257-J. Continuous Annealing With Carbon Restoration. J. D. Armour. *Industrial Heating,* v. 19, Sept. 1952, p. 1586-1588, 1590, 1592, 1594, 1596, 1598, 1726-1729.

Continuous roller hearth carbon restoration furnace at Union Drawn Steel Div., Republic Steel Corp., Massillon, Ohio. Carbon restoration occurs during annealing. Theory and operation for carbon and alloy steel. Photomicrographs of structure, pre and post treatment. (J23, M27, CN, AY)

258-J. Harden Cutting Edges and Increase Wear Resistance of All Types of Steel. E. M. Ellsworth. *Industry & Welding,* v. 25, Oct. 1952, p. 108, 111-113.

Results of using a compound which combines nitriding, carburizing, and chromizing in one operation. Pictorial evidence of results. Advantages and applications are given. (J28, L15, ST)

259-J. How to Heat Treat Aluminum. Floyd A. Lewis. *Materials & Methods,* v. 36, Sept. 1952, p. 99-103.

Survey includes preheating, annealing, solution heat treatment and aging, and equipment. Extensive table. (J general, Al)

260-J. (Japanese.) **The Decarburization of Iron and Steel. III. Decarburization and Degasification of Iron Plates.** Masuo Kawakami and Mayumi Someno. **IV. The Relationship Between Rate of Gas Extraction and Diffusion Constant of Carbon in Iron.** Mayumi Someno. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 16, Jan. 1952, p. 34-42.

Carbon-determination apparatus and procedure. Results of investigation on decarburization with wet and dry H_2. Rates of gas extraction were measured by two methods. Diffusion constant was calculated from these rates. Tables, graphs, and diagrams. (J28, N1, Fe, ST)

261-J. Why We Now Make Better Stainless Steels. J. J. Heger. *American Machinist,* v. 96, Oct. 13, 1952, p. 119-122.

Selection and heat treatment of stainless steels have been simplified by advances in steel melting practices and improved knowledge of heat treatment. Mechanical properties, weld tests and stress-relief. Future outlook in heat and corrosion resistant steels. Diagrams and graphs. (J general, Q general, K9, SS)

262-J. How to Maintain Heat-Treating Equipment. T. A. Frischman. *American Machinist,* v. 96, Oct. 13, 1952, p. 135-146.

Suggestions for inspection and repairs to equipment which is subject to high temperature, corrosive gases, temperature changes, and thermal and mechanical stress. Tables and photographs. (J general)

263-J. Armor Plate Quenched Rapidly, Uniformly in Hydraulic Press. G. A. Leytze. *Iron Age,* v. 170, Oct. 16, p. 97-99.

Process as carried out by the Williamson Heater Co. (J26, AY)

264-J. Carburizing of Steels. John L. Everhart. *Materials & Methods,* v. 36, Oct. 1952, p. 135-150.

Carburizing methods, heat treatment after carburizing, properties of carburized steels, causes of defects, and applications. Photographs and graphs. (J28, AY)

265-J. Controlled Atmosphere Tempering. Harold N. Ipsen and Donald R. Mathews. *Metal Progress,* v. 62, Oct. 1952, p. 123-128.

Theoretical considerations involved, and desirable conditions to be striven for. Process and equipment for controlled oxidation as well as tempering. (J29, ST)

266-J. Compressed Air as Cooling Medium in Patenting Steel Wire. B. M. Pearson. *Wire Industry,* v. 19, Sept. 1952, p. 824, 827.

Recent progress in wire heat treatment techniques. (To be continued.) (J25, ST)

267-J. Versatile Pit Furnace. Carburizes, Hardens, and Draws—'Round-the-Clock. A. H. Koch. *Metal Treating,* v. 3, Sept.-Oct. 1952, p. 2-3.

Furnace in which SAE 1020, 1045, and 1335 steels, among others, are treated. Diagram and photographs. (J26, J28, F21, CN, AY)

268-J. (English.) **High Frequency Heating and Temperature Distribution in Surface Hardening of Steel.** L. A. Dreyfus. *Acta Polytechnica,* (Electrical Engineering Series), v. 4, no. 5, 1952, 115 pages.

General survey of surface hardening methods and problems is followed by mathematical analyses (graphically interpreted) of eddy currents in ferromagnetic conductors having a red-hot nonmagnetic outer zone enveloping a magnetic core at lower temperature; surface heating of pieces of "great specific thickness" (heat flow in 1 dimension); and surface heating of pieces of "small specific thickness". (J2, ST)

269-J. (German.) **Chemical and Physical Bases of Malleablizing in a Gas Stream.** K. Roesch. *Giesserei,* v. 39, Sept. 18, 1952, p. 487-491.

Comprehensive analysis, including both theory and experiment. Compares technology and economics of use of gas and use of ore. Tables, graphs, and illustrations. (J23, CI)

270-J. (German.) **Increasing the Resistance to Wear of Cylinders in Combustion Motors.** H. Wiegand and G. Schäffeler. *Metalloberfläche,* sec. A, v. 6, Sept. 1952, p. 129-133.

Various processes for increasing the hardness of cylinder surfaces, such as heat treatment for producing high surface hardness, and methods for deposition of hard metal coatings. Relative advantages of the various methods. Micrographs. (J general, L24, SG-m)

271-J. (German.) **Heat Treatment of Aluminum and Its Alloys.** A. von Zeerleder. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 18, July 1952, p. 209-219; Aug. 1952, p. 255-264.

The furnaces required; also temperature measurement and control equipment. Effects of various heat producers and media for transmission of heat. Photographs and micrographs. (J general, A1)

272-J. (German.) **Investigations on Heat Treatment of Hot Working Toolsteels Within the Intermediate Transformation Temperature Range.** Walter Eilender, Robert Mintrop, and Willy Lutz. *Stahl und Eisen,* v. 72, Sept. 11, 1952, p. 1149-1156; disc., p. 1156-1157.

Results of microscopic, hardness, and magnetic examinations on behavior during transformation in the intermediate range of five alloy steels containing 0.24-0.46% C, 0.13-0.6% Si, 0.3-1.3% Mn, 1.3-2.6% Cr, 0-0.5% Mo, 0.2-1.7% Ni, 0.1-0.8% V, and 0-8.4% W. (J26, N8, TS)

273-J. (German.) **Comparison of the Technological Properties of Drawn Steel Wire as Related to Patenting in Lead and Salt Baths and Patenting in Air.** Clemens Eisenhuth and Hanns Krautmacher. *Stahl und Eisen,* v. 72, Sept. 25, 1952, p. 1217-1221.

Relative technology and economics of the various processes and media for patenting of steel wire. (J25, ST)

274-J. Heat Transfer in Liquid Bath Furnaces. M. H. Mawhinney. *Industrial Heating,* v. 19, Oct. 1952, p. 1788-1790, 1792, 1794, 1796, 1798, 1800, 1872, 1874-1876.

Results obtained in actual furnaces utilizing a liquid heating medium for metal coating, removal of oxides, and for heat treating of metals in the form of wire. They are presented as an aid in estimating capacity and performance to be expected from other furnaces. Graphs and tables. (J general, L16)

275-J. Cost Analysis in Industrial Heating. B. W. Depew. *Industrial Heating,* v. 19, Oct. 1952, p. 1802, 1804, 1806, 1808, 1810, 1812, 1814.

Cost breakdown analysis in phases of annealing malleable iron castings, furnace brazing, heat treatment, hot-dip galvanizing, and heating for forging. (J general, K8, L16, F21, CI)

276-J. (German.) **Carburizing, Nitriding, and Siliconizing Surface Layers of Iron Containing Tungsten and Molybdenum.** Erich Fitzer. *Archiv für das Eisenhüttenwesen,* v. 23, Sept.-Oct. 1952, p. 377-382.

Experiments prove that above treatments greatly improve hardness and surface condition of molybdenized and tungstenized parts of iron or steel. Optimum conditions for this treatment were investigated. Tables, graphs, and photomicrographs. 10 ref. (J28, L15, ST, Fe)

277-J. Short Cycle Annealing for Malleable Iron. C. E. Rehder. *Canadian*

Metals, v. 15, Oct. 1952, p. 70, 72.

Developments at Bowmanville, Ont., where a short-cycle, flexible annealing process offers economic advantages. (J23, CI)

278-J. Titanium Can Be Case Hardened by Nitriding. Edmond J. Silk. *Iron Age,* v. 170, Nov. 13. 1952. p. 166-170.

Investigation carried out by Sam Tour & Co., to surface harden Ti. Graphs, tables, and micrographs. (J28, Ti)

279-J. (Italian.) **Isothermal Annealing of Hypereutectoid Steels.** Mario Baj. *Metallurgia Italiana,* v. 44, Aug.-Sept. 1952, p. 319-329.

Advantages, such as shorter processing time and higher degree of softening, and comparison with those of other methods. Difficulties of large-scale application. Tables and micrographs, 10 ref. (J23, ST)

SECTION K

JOINING

1-K. Hot Air "Welds" Plastics. Frank Charity. *American Machinist,* v. 95, Nov. 12, 1951, p. 164-165.

Thermoplastics, Pb-Bi alloys, low-melting-point solder, and other materials which melt or soften at temperatures of less than 650° F. are being joined by means of recently developed "hot-jet" equipment. (K6, SG-d)

2-K. Automatic Welding in Steel Plant Maintenance. William P. Hoffman. *Blast Furnace and Steel Plant,* v. 39, Nov. 1951, p. 1348-1353.

Equipment and procedures for miscellaneous repair and resurfacing jobs. (K1, CN)

3-K. Brazing and Welding Copper and Aluminium for Electrical Connections. E. V. Beatson. *Engineer,* v. 192, Oct. 19, 1951, p. 501-503; Oct. 26, 1951, p. 533-536.

Recommended procedures and equipment. Characteristics of different heating methods and brazing alloys. First installment: Torch brazing Cu to Cu; carbon resistance brazing; direct interfacial-resistance brazing; and silver-coating brazing of Cu and Cu alloys. Second and concluding installment: Zn-coating brazing of steel to Cu, brazing of Al, properties of brazed joints in Cu, gas welding, arc welding, carbon-arc welding, inert-gas welding, spot welding, butt welding, pressure welding, and cold welding. (K general, K8, Cu, Al, ST)

4-K. Welding With Aluminum Bronzes. E. C. Mantle. *Engineering,* v. 172, Oct. 5, 1951, p. 443-444.

The Al bronzes are a potentially useful group of filler-rod materials for making high-strength welds in Cu-base alloys. Their mechanical strength is among the highest obtainable from Cu-base alloys and they have excellent resistance to corrosion under a wide range of conditions. The presence of a strong oxide film on the surface of the metal makes gas welding with these alloys difficult, but certain metallurgical factors are taken into consideration, the alloys are quite suitable for arc welding. Experimental work with the three main types. (K1, K2, Cu)

5-K. How New Process Bonds Aluminum and Alloys to Cast Iron, Steel and Stainless Steel. W. F. Palmer. *Industrial Gas,* v. 30, Nov. 1951, p. 5-7.

Process developed by Fairchild Engine & Airplane Corp. calls for extreme uniformity and accuracy of temperature control. (K12, Al, SS, ST, Fe)

6-K. Adhesive Bonding of Magnesium Assemblies. *Magazine of Magnesium,* Nov. 1951, p. 10-15.

Recommended equipment and procedures, using Consolidated Vultee's Metlbond process. (K12, Mg)

7-K. Welding Unstabilized Austenitic Stainless Steels Without Carbide Precipitation. J. A. Goodford and D. W. Kaufmann. *Materials & Methods,* v. 34, Nov. 1951, p. 64-65.

Rapid cooling of the heat-affected zone after welding reduces chances of subsequent intergranular corrosion. (K1, SS)

8-K. Methods of Minimizing Cracking at Temperatures Above the Solidus During the Fusion Welding of Aluminium Alloys by the Oxyacetylene and Argon-Arc Processes. D. C. Moore. *Sheet Metal Industries,* v. 28, Nov. 1951, p. 1025-1037, 1040.

The theoretical treatment of Pumphrey and Jennings has been utilized for the development of practical methods. Details of experiments. 18 ref. (K2, K1, Al)

9-K. An Unusual Louver Order; Fabricating and Assembling 12,000 Aluminum Louvers for 300 Ft. British "Skylon". *Sheet Metal Worker,* v. 43, Nov. 1951, p. 36-39, 82. (Condensed from *Sheet Metal Industries.)*

Shop methods for fabricating and

assembling the many components for the huge Skylon. The 12,000 louvers were made in almost 500 different lengths, some varying only 0.010 in. 96,000 rivets were used with 24,000 rivet backing plates. (K13, T26, Al, CN)

10-K. Huge Welders Handle Largest Aircraft Fuel Tanks. *Steel,* v. 129, Nov. 19, 1951, p. 95-96.

New resistance-welding machines, among the largest of their type in the country, installed at Ryan Aeronautical Co. to handle huge aircraft structures and jet-engine-exhaust components. (K3)

11-K. Production of Welded Gear Drives. *Welding and Metal Fabrication,* v. 19, Nov. 1951, p. 412-418.

Miscellaneous welding equipment and procedures of Falk Corp., Milwaukee. In general, only mild steel is fabricated. (K general, T7, CN)

12-K. Prefabricated Tugs Built in Finland. H. Branders. *Welding and Metal Fabrication,* v. 19, Nov. 1951, p. 421-423.

Welding equipment and procedures of Finnish shipyard. (K general, T22, CN)

13-K. Resistance Welding Alloy Steels. R. Bushell. *Welding and Metal Fabrication,* v. 19, Nov. 1951, p. 424-426.

Various types of equipment and procedures. Recommendations. (K3, AY)

14-K. Fabrication at the Davy, Paxman Works. *Welding and Metal Fabrication,* v. 19, Nov. 1951, p. 427-434.

Equipment and procedures for forming and welding of heavy equipment in various steels. (K general, G general, ST)

15-K. The E. S. S. Welding Process. (Concluded.) H. O. Willrich. *Welding and Metal Fabrication,* v. 19, Nov. 1951, p. 435-437, 441.

A German arc-welding process. (K1)

16-K. Welding Fixtures for Use With Submerged Arc. John Berkeley. *Welding Journal,* v. 30, Nov. 1951, p. 977-985.

Successful use of automatic welding requires efficient deposition of flux, disposal of the slag, recovery of unfused material, adequate backing, and suitable fixtures for the techniques employed. Types of machines used for circumferential and longitudinal seams. (K1)

17-K. The Inert-Arc Welding of Thin-Walled Tubing. R. S. Zeno and H. L. C. Leslie. *Welding Journal,* v. 30, Nov. 1951, p. 986-992.

Techniques for inert-arc welding of thin-walled tubing made of stainless steel, mild steel, nickel, titanium, molybdenum, and Fernico. (K1, SS, CN, Ni, Ti, Mo, SG-n)

18-K. Pressure Welding. Part III. Hot-Pressure Welding. Frank S. Gardner. *Welding Journal,* v. 30, Nov. 1951, p. 995-1003.

Historical review of hot pressure welding, classification of welding processes, precautions, procedures, design, quality control and special applications to Al and its alloys. 14 ref. (K5, Al)

19-K. Resistance Variations During Spot Welding. W. L. Roberts. *Welding Journal,* v. 30, Nov. 1951, p. 1004-1019.

Resistance variations in the formation of spot welds in low-carbon steel, stainless steel, and aluminum 3S alloy including the electrical conduction of various contacts and methods for the measurement of resistance. (K3, CN, SS, Al)

20-K. Safe Practice in Oxyacetylene Welding and Cutting. Simon A. Greenberg. *Welding Journal,* v. 30, Nov. 1951, p. 1020-1025.

Safety in welding and cutting has been achieved through recognition of the hazards, and through the establishment of proper precautions to deal with them. (K2, G22, A7)

21-K. Good Welding Setups. James E. Dipert. *Welding Journal,* v. 30, Nov. 1951, p. 1026-1028.

Automatic and semi-automatic machines using submerged arcs do fast work besides insuring excellent joints. Some weldments displace cast steel, yielding superior products at lower cost. (K1)

22-K. Seam Welding of Monel Metal. Ernest F. Nippes and Gerald M. Slaughter. *Welding Journal,* v. 30, Nov. 1951, p. 537s-544s.

Results of an investigation to determine the optimum conditions for seam welding of monel sheet 0.010-0.062 in. thick. Satisfactory seam welds require no porosity in the nugget, good penetration, sufficient overlap, and wide current range. (K3, Ni)

23-K. Nested Electrodes for Metal-Arc Welding. William A. Snyder. *Welding Journal,* v. 30, Nov. 1951, p. 557s-564s.

Electrode consists of two or more filler metal rods nested together but insulated from each other except at the end where they are gripped by the electrode holder; at this point they are connected to each other or to a common source of current. (K1)

24-K. The Welding of Heat Resistant Alloy Sheets. *Metal Progress,* v. 60, Nov. 1951, p. 118, 120, 122, 124, 126, 128. (Condensed from "Welding of

Heat-Resistant Alloys in Sheet Form".) H. E. Lardge. *Iron and Steel Institute.*

Previously abstracted from "Symposium on High Temperature Steels and Alloys for Gas Turbines." See item 487-K, 1951. (K general, SS, AY)

25-K. Machine Seamwelds Front Fenders Faster. W. G. Patton. *Iron Age,* v. 168, Dec. 13, 1951, p. 134-135.

How Buick front fenders are being seam welded on an ingenious new machine which combines the advantages of a fender bender and seam welder. Production rate is 180 fenders per hr. Heating operation for forming around headlight area was eliminated. Savings in press time, handling and finishing were effected. (K3, G4, CN)

26-K. Welding Aluminum Is No Problem. *Industry & Welding,* v. 24, Dec. 1951, p. 31-32, 61.

Use of inert-gas shielded-arc welding in the fabrication of Al fuel tanks for jet planes. (K1, Al)

27-K. Fundamental Facts About Stud Welding. *Industry & Welding,* v. 24, Dec. 1951, p. 45-47.

Versatility of the process. (K1)

28-K. Re-Design for Welding at Baker Industrial Truck. *Industry & Welding,* v. 24, Dec. 1951, p. 48-49, 51-53.

Welded design gives 25% reduction in assembly time, 35% saving in weight. Fork-truck users get better equipment, improved operation, and easier maintenance. (K1, T21, ST)

29-K. How to Seal Glass to Metal in Mass Output. Bob G. Bender. *Ceramic Industry,* v. 57, Dec. 1951, p. 76-78, 113, 115.

Process for manufacturing glass-metal television picture bulbs. (K11, ST)

30-K. New Welded Full View Mast. J. B. McCormick. *Petroleum Engineer,* v. 23, Dec. 1951, p. B62, B65-66, B68, B70.

Combination of welded and bolted design has advantages of the standard drilling derrick as well as light portable rig. (K general, T28, ST)

31-K. Metal Bonding Makes Strong, Smooth Assemblies. Gerald Eldridge Stedman. *Steel,* v. 129, Dec. 17, 1951, p. 90-93.

Attachment of thin Mg skins to doublers and reinforcing members by an adhesive bonding process that avoids attachment blemish and gives a smooth exterior surface on locations like trailing edges in airplanes. It eliminates rivet patterns outside of attachment areas and provides excellent resistance to fatigue in areas subject to vibration. (K12, Mg)

32-K. Some Basic Ideas on Adhesion. N. A. de Bruyne. *Plastics,* v. 16, Nov. 1951, p. 308-309.

A survey. Ideas on how metals are glued are included. (K12)

33-K. Metal Stitching Speeds Assembly, Reduces Cost. Arthur G. Denne. *Tool Engineer,* v. 27, Dec. 1951, p. 50-52.

The stitch-forming mechanism of a metal stitcher. Strength of metal-stitched joints. Recommended thicknesses of materials for assembly by metal stitching. (K13)

34-K. Large Flat-Face Cathode-Ray Tubes for Radar. C. S. Szegho. *Tele-Tech,* v. 10, Dec. 1951, p. 52-53, 94.

Glass-to-metal sealing techniques developed for TV are now being applied to manufacture of tubes providing larger direct-view, radar displays. Flat faces permit plotting or superimposing information such as markers or maps. (K11, T1)

35-K. Saved Steel, Cut Costs. La-Motte Grover. *Welding Engineer,* v. 36, Dec. 1951, p. 25-27, 42-43.

Use of welded construction in New York City hospital-addition project. Material and money savings thus made possible. (K1, T26, ST)

36-K. Making "Bulldogs" at Cadillac. *Welding Engineer,* v. 36, Dec. 1951, p. 28-29.

Use of arc welding in construction of military tanks at Cleveland Tank Plant, Cadillac Motor Car Div., General Motors Corp. (K1, T2, CN)

37-K. "Tanks-a-Million". Clyde Smith. *Welding Engineer,* v. 36, Dec. 1951, p. 30-31.

Use of manual and automatic inert-arc welding processes, to help Beeson Tank Co. live up to the above slogan in the production of aluminum tanks. (K1, T26, Al)

38-K. Rail Welding and Reconditioning. Fred M. Burt. *Welding Engineer,* v. 36, Dec. 1951, p. 32-34.

Procedures and equipment of Southeast Custom Welding Co., Los Angeles, contract welder for Los Angeles Junction Railway. (K1, K2, CN)

39-K. Welding the Superalloys. John Starr. *Welding Engineer,* v. 36, Dec. 1951, p. 35-37, 54.

Various welding procedures and equipment used by Stainless Steel Products, Inc., Burbank, Calif., for joining miscellaneous ferrous and nonferrous alloys used in jet engines and other high-temperature applications. (K general, SG-h)

40-K. Automatic Equipment to Seam Weld Containers. C. S. Seltzer. *Welding Engineer,* v. 36, Dec. 1951, p. 38-42.

See abstract of "Seam Welding

Containers Automatically," *Welding Journal,* item 563-K, 1951. (K3, CN)

41-K. Resistance Welding Saves Time and Money. Frank Charity. *Modern Machine Shop,* v. 24, Dec. 1951, p. 198-200, 202, 204, 206, 208, 210, 212.

Use of resistance welding in the assembly of airplane structural components. (K3, T24)

42-K. Automatic Riveting. Reed B. Scott. *Western Machinery and Steel World,* v. 42, Nov. 1951, p. 82-83.

Equipment and procedures of Lockheed Aircraft in fabrication of P2V patrol bomber wings. (K13, T24)

43-K. Cost Saving; Metal Stitching Speeds Aluminum Door Assembly. C. H. Taylor. *Western Machinery and Steel World,* v. 42, Nov. 1951, p. 94-95. (K13, Al)

44-K. The Physical and Metallurgical Characteristics of Spot-Welded Titanium. M. L. Begeman, F. W. McBee, Jr., and J. C. Fontana. *Engineers Digest,* v. 12, Nov. 1951, p. 363-364, 382.

See abstract from *Welding Journal,* item 573-K, 1951. (K3, Ti)

45-K. Recent Development in Ethoxyline Resins. Phil E. Preiswerk. *Light Metals,* v. 14, Nov. 1951, p. 594-597.

Emphasis on their use for joining metals to metals, ferrous to nonmetals, etc. (K12)

46-K. Processes Used in Bonding Metals. F. H. Parker. *Light Metals,* v. 14, Nov. 1951, p. 597-603.

Emphasis on the Redux process. Details of curing equipment, preparation for curing, the curing process, testing and inspection procedures, and advantages of metal-to-metal bonding. (K11)

47-K. Argon Arc Welds in an Al-Mg Alloy. T. Morgan. *Light Metals,* v. 14, Nov. 1951, p. 605-613.

Recommended procedures. Results of tensile strength and hardness determinations on the welds. (K1, Q27, Q29, Al)

48-K. Site-Work on Light-Alloy Mine Equipment. J. C. Bailey. *Light Metals,* v. 14, Nov. 1951, p. 615-616.

Discusses previous article entitled "Duralumin Mine Skips and Cages". Methods for repair and riveting. (K13, T28, Al)

49-K. Welded Aluminum Piping. D. R. Cheney. *Metal Industry,* v. 79, Nov. 23, 1951, p. 441-445.

Equipment and materials required, the effect of welding on the properties of the piping, welding techniques, and suitable applications. (K general, Al)

50-K. The Bonding of Metals. C. J. Moss. *Journal of the Birmingham Metallurgical Society,* v. 31, Sept. 1951, p. 149-161.

Reviews use of synthetic-resin adhesives for the above. 11 ref. See abstracts from *Metal Progress,* item 587-K, 1951. (K11)

51-K. The Welding of Copper Pressure Vessels by Means of the Oxygen-Acetylene Process. F. T. Galton. *Australasian Engineer,* Oct. 8, 1951, p. 70-73.

Established practices and further research. The requirements of welding Cu. A large project for welded Cu pressure vessels. (K2, Cu)

52-K. Resistance Welding and Its Application Technique. (In French.) Mario Sciaky. *Revue de la Soudure; Lastijdscrift,* v. 7, No. 3, 1951, p. 147-166.

Results of an investigation of various types of apparatus. Various machines and their modes of operation. Choice is determined by economic factors rather than by technical ones. (K3)

53-K. Arc Welding in an Atmosphere of Argon. (In French.) A. Moreau. *Revue de la Soudure; Lastijdschrift,* v. 7, No. 3, 1951, p. 163-177.

Principles and technology of the process. Various types of apparatus for the purpose and their mode of operation. Application of this type of welding to different metals; also spot welding and welding with a consumable electrode in an atmosphere of argon. (K1)

54-K. High-Frequency Apparatus for Starting and Maintaining an Arc. (In French.) M. Moneyron. *Soudure et Techniques connexes,* v. 5, Sept.-Oct. 1951, p. 217-220; disc., p. 220-221.

The permanent pilot spark connected to welding apparatus is often the cause of radio interference. An improved method to lessen these disturbances. (K1)

55-K. Procedures for Carrying Out Expanded Right-Hand Welding. (In German.) W. Hofmann, H. v. Hofe, and W. Newiger. *Schweissen und Schneiden,* v. 3, Oct. 1951, p. 297-304.

Method eliminates inherent tensions in steel welds by flame aftertreatment of the weld. 13 ref. (K2, J2, ST)

56-K. How to Discover New Welding Processes by Systematizing the Field. (In German.) H. v. Neuenkirchen. *Scheweissen und Schneiden,* v. 3, Oct. 1951, p. 311-314.

Systematically arranges the various welding processes. Gaps in the tables show new possibilities for combinations to be investigated. (K general)

57-K. "EHV" Welding. (In German.) Richard Marek. *Schweisstechnik,* v. 5, Sept. 1951, p. 97-102.

Welding method for steel in which

the electrode is coated, preferably with copper, in order to avoid undesirable phenomena otherwise incurred in arc welding. "EHV" is an abbreviation for "Elin-Hafergut". (K1, ST)

58-K. Quality Problems in the Submerged-Arc Welding Process. (In German.) Max Komers. *Stahl und Eisen,* v. 71, Nov. 8, 1951, p. 1225-1232.

Development, applications, and advantages of the process as compared with other welding methods for steel. Types of welding fluxes, their compositions, and efficiencies; Mn losses with different powder types; structure and joint shape in 2-layer and multiple-layer welding. Notched-bar impact strength, ultimate strength, and structure of the welds after different heat treatments. Effects of P and S segregations on crack development in the welds, also nondestructive testing of the welds. (K1, K9, ST)

59-K. Experimental Determination of the Distribution of the Strains in the Joints of Single-Line Rivets Subject to Static Stressing. (In Italian.) E. von Burg. *Alluminio,* v. 20, Sept. 1951, p. 341-350.

Distribution of strains, both in the rivets and the sections of the joint, were investigated for several Al-alloy rivet compositions. (K13, Q25, Al)

60-K. Study of Shrinkage Fitting. (In Portuguese.) Ferrucio Fabriani. *Boletim da Associacao Brasileira de Metais,* v. 7, July 1951, p. 321-345.

Theoretical review. Distinguishes between force fit, shrink fit, and freeze fit. Attempts to systematize the entire problem. (K13)

61-K. New Frequency Converter Welders Developed for Aircraft Alloys. F. L. Brandt. *Iron Age,* v. 168, Dec. 27, 1951, p. 72-73.

Tentative standards set up by Resistance Welder Manufacturers' Association and National Electrical Manufacturers' Association for spot-welder frequency welders of two types, commercial and aircraft. New-type welders have been developed for high-temperature, corrosion resistant alloys. (K3, SG-g, h)

62-K. Research Progress by the British Welding Research Association. H. E. Taylor and H. G. Taylor. *Sheet Metal Industries,* v. 28, Dec. 1951, p. 1121-1130, 1136.

Reviews research under way in the laboratories of the Sheet and Strip Metal Users' Technical Assn. Formulation of codes of practice for resistance welding processes is an important object of the work. 15 ref. (K9, K3, Ag)

63-K. A Review of the Theory and Practice of Inert-Gas Shielded-Arc Welding. W. J. Jackson. *Sheet Metal Industries,* v. 28, Dec. 1951, p. 1131-1136.

A survey. 14 ref. (K1)

64-K. Synthetic Resin Adhesives. F. Chapman. "Adhesion and Adhesives" (Elsevier Publishing Co., New York), 1951, p. 201-249.

Various phases of thermosetting and thermoplastic adhesives. Properties required for metal-to-metal, metal-to-wood, and wood-to-wood bonding. 98 ref. (K12)

65-K. Rubbery Adhesives. G. Salomon and W. J. K. Schönlau. "Adhesion and Adhesives" (Elsevier Publishing Co., New York), 1951, p. 386-426.

Adhesion of rubber to metals. Emphasis is placed on brass plating. 19 ref. (K11, Cu)

66-K. Adhesion in Soldered Joints. W. R. Lewis. "Adhesion and Adhesives" (Elsevier Publishing Co., New York), 1951, p. 427-462.

Methods of soldering, influence of surface condition, treatment of oxidized surfaces, structure of the bond, nature of compound layers, effect of rate of cooling, and strength of solders. Includes all solderable metals. 38 ref. (K7, EG-f)

67-K. Design for Redux. H. Giddings. *Aircraft Production,* v. 13, Dec. 1951, p. 387-392.

Basic characteristics of the Redux joint. Application of Redux to the basic types of structural element in aircraft, to the stiffened panel of various forms subject to compression, shear and bending types of loading. Redux specimens consisted of D.T.D. 610-type Al alloy. Diagrams and graphs. (K12)

68-K. Welding Band-Saw Blades. H. J. Chamberland. *American Foundryman,* v. 20, Dec. 1951, p. 53-54.

How to select and use welding equipment designed to produce band-saw welds that hold up under high or super high speeds. The portable flash welder is recommended. (K3, ST)

69-K. How to Tip Tools With Prehardened HSS. Leo J. St. Clair. *American Machinist,* v. 96, Jan. 7, 1952, p. 133-140.

How to braze prehardened high-speed-steel tips to ordinary steel tool shanks, for conservation of critical Co and W. The author grants free permission for use of patents held by him on the process. Numerous schematic diagrams. (K8, TS, CN)

70-K. Aluminum Cylinder Head Formed by New Methods. Frank Jardine. *Automotive Industries,* v. 195, Dec. 15, 1951, p. 34-35, 112.

How furnace brazing of individual permanent-molded sections permits

economical production of light-alloy cylinder blocks and heads. (K8, T7, Al)

71-K. Metlbond Process for Joining Metal With Adhesives. G. G. Havens and E. P. Carmichael. *Automotive Industries,* v. 195, Dec. 15, 1951, p. 48-49, 102, 104, 106, 108.

How the utilization of organic materials in thin glue-line form gives joints equal or superior in strength to the materials joined. (K12)

72-K. Studies of Ceramic Fluxes for Welding Steel. II. Willi M. Conn. *Ceramic Age,* v. 58, Nov. 1951, p. 15-17.

Electric-arc welding by the submerged-arc process. Eleven principal requirements which must be met by a flux. Performance of fluxes prepared by different methods, including those consisting of a mechanical mixture of several ingredients, flux based on glass, and that based on mullite. (K1, ST)

73-K. Better Welding at Lower Cost. Lew Gilbert. *Industry & Welding,* v. 24, May 1951, p. 50, 52; Sept. 1951, p. 43-44, 76-77; Jan. 1951, p. 57-58, 80.

Various factors which determine quality and cost of welding. Hints for securing improved quality and lower costs. Selection of correct electrode types and proper electrode sizes. Data are tabulated. (K1)

74-K. Metal Stitching Speeds Aluminum Door Assembly. Harry Smith. *Light Metal Age,* v. 9, Dec. 1951, p. 18.

The process and its advantages over welding or riveting. (K13, Al)

75-K. Improved Welding Techniques Join Stainless to Mild Steel. *Industry & Welding,* v. 25, Jan. 1952, p. 50-52, 55.

Heavy pipe-to-pipe welding is being mechanized by use of a standard submerged-arc head. (K1, SS, CN)

76-K. High Speed Silver Brazing. *Industry & Welding,* v. 24, Jan. 1951, p. 65.

A 45% silver alloy, containing Cu, Cd, and Zn is preformed of 0.047-in. wire to 1⅜-in. o.d. rings. Set in place on flanged and flared parts of 4130 steel, $\frac{3}{32}$-$\frac{3}{64}$ in. thick, the entire assembly is quickly brushed with a water-soluble flux and set on a moving endless belt. (K8, Ag, Cu, Cd, Zn, AY)

77-K. Major Advancements in Welding Design, Materials, and Methods. Howard Cary. *Industry & Welding,* v. 25, Jan. 1952, p. 31-32, 34, 72-73.

Techniques developed at Marion Power Shovel Co. (K general)

78-K. High Hardenability Steels Flash-Welded Automatically. Jon Ruhlman and B. E. Nye. *Iron Age,* v. 168, Dec. 20, 1951, p. 95-99.

The flash-butt welding process in use in the fabrication of aircraft landing gears from high-strength alloy steels. (K3, AY)

79-K. Current Welding Research Problems. *Journal of the American Society of Naval Engineers,* v. 63, Nov. 1951, p. 991-1005.

Previously abstracted from *Welding Journal.* See item 393-K, 1951. (K9)

80-K. Metals and Nonmetals Joined Efficiently by Stitching. Arthur G. Denne. *Materials & Methods,* v. 34, Dec. 1951, p. 76-79.

Capabilities, limitations, and applications of the process. Includes wood, metals, and plastics. (K13)

81-K. Welding Magnesium Alloys. R. L. Nelson and I. C. Mattson. *Metal Industry,* v. 79, Dec. 7, 1951, p. 475-477; Dec. 14, 1951, p. 495-498.

Previously abstracted from *Welding Engineer.* See item 641-K, 1951. (K general, Mg)

82-K. Coating Moisture and Welding Cracking. *Metal Progress,* v. 60, Dec. 1951, p. 152, 154, 156. (Condensed from "Nickel-Molybdenum-Vanadium Alloy Steel Shielded-Arc Welding Electrodes [Low Hydrogen Type]," E. H. Franks, C. T. Gayley, and W. H. Wooding.)

Previously abstracted from *Journal of the American Society of Naval Engineers.* See item 516-K, 1950. (K1, T5. CN, AY)

83-K. The Bonding of Friction Fabric. G. S. Learmonth. *Plastics,* Dec. 1951, p. 340-341.

Factors which affect the bonding of friction fabrics to their metallic supports are temperature, solvents remaining on the adhesive film before bonding, pressure during bonding, and baking-time temperature. (K11)

84-K. Forum on Technical Progress: Fastening & Assembling. *Steel,* v. 130, Jan. 7, 1952, p. 379-380, 382, 384-386, 389-390, 393, 396, 398.

Brief discussions by men from industry on the present situation and anticipations for 1952. (K general)

85-K. Probabilities of Interference Between Resistance Welders. W. K. Boice. *Transactions of the American Institute of Electrical Engineers,* v. 70, pt. 1, 1951, p. 775-783.

Calculated data concerning the probabilities that the voltage during a resistance weld will be inadequate because of voltage drops due to other welders. This information is useful for design or power systems for supplying groups of welders. Graphs. 10 ref. (K3)

86-K. Welding Calculations—Effect of Conductor Configuration in Over-

head Lines. H. Watson Tietze. *Transactions of the American Institute of Electrical Engineers,* v. 70, pt. 1, 1951, p. 784-786.

Results of an investigation show that proper evaluation of the magnitude of the voltage dip in single-phase welding problems requires recognition of the changes in reactance of conductors, disposed on a horizontal crossarm, due to interaction of the phase currents. (K3)

87-K. A-C Arc Welders With Saturable Reactor Control. S. Oestreicher. *Transactions of the American Institute of Electrical Engineers,* v. 70, pt. 1, 1951, p. 787-790.

Characteristics of the equipment. Illustrations, graphs and diagrams. (K1)

88-K. The Physical Mechanism of Low- and High-Current Arcs, and Their Relation to the Welding Arc. Wolfgang Kinkelnburg. *Transactions of the American Institute of Electrical Engineers,* v. 70, pt. 1, 1951, p. 800-803.

(K1)

89-K. Production of the All-Welded Bicycle. *Welding and Metal Fabrication,* v. 19, Dec. 1951, p. 450-456.

Sequence of operations and the techniques involved.
(K general, T10)

90-K. The World's Largest Walking Dragline. *Welding and Metal Fabrication,* v. 19, Dec. 1951, p. 466-473.

Design and construction of an all-welded 282-ft. jib. Material is high-tensile steel. (K1, T26, CN)

91-K. Submerged-Arc Welding in Tandem. E. A. Clapp. *Welding Engineer,* v. 37, Jan. 1952, p. 43-47.

A new method which uses 3-phase power in submerged-arc welding. Welding speeds are two to three times faster than can be obtained with a single-rod technique. The effects of phase angle, phase sequence, power distribution between rods, and of primary power factor were investigated. Most of these factors were found to have considerable influence on the quality of the welds produced. (K1)

92-K. "Permanent" Pipe Lines for Liquid Food Products. H. L. Bindeman and L. N. Hoopes. *Welding Engineer,* v. 37, Jan. 1952, p. 48-50.

Advantages of using permanent welded pipe for conveying liquid food products. Gas or arc welding may be used. Planning the line, preparing and welding pipe, grinding, polishing, cleaning, and sterilizing. (K1, K2, T29, SS)

93-K. Ways to Fabricate Monel Tanks for Boats. H. B. Bott. *Welding Engineer,* v. 37, Jan. 1952, p. 33-35.

Welding processes for attaching tank heads, installing baffles, and adding pipe fittings. (K general, Ni)

94-K. How Ryan Makes "Sky-Beams". *Welding Engineer,* v. 37, Jan. 1952, p. 36-37.

Spot welding of Al beams for strato-freighters at Ryan Aeronautical Co. Forming and heat treatment of the floor beams.
(K3, G general, J general, Al)

95-K. Big Welded Relief Valve Goes Into Hoover Dam. T. B. Jefferson. *Welding Engineer,* v. 37, Jan. 1952, p. 38-39, 47.

Describes welding procedure for the above. (K1, T26, ST)

96-K. New Welded Addition to Seattle Store. Ray Bloomberg. *Welding Engineer,* v. 37, Jan. 1952, p. 40-42.

Construction of the building. Compares advantages of welded steel and reinforced concrete.
(K1, T26, ST)

97-K. Corrosion-Free Stainless Welds. G. E. Linnert. *Welding Engineer,* v. 37, Jan. 1952, p. 51-53.

Properties of welded joints in extra-low-carbon stainless steels, particularly resistance to intergranular corrosion. Practically all welding methods can be used. Use of these steels eliminates postweld annealing, simplifies field repair, reduces metal costs and conserves columbium.
(K general, R2, Q general, SS)

98-K. Arc Welding Redesign Is Evolution Not Revolution. R. P. Lindgren. *Welding Engineer,* v. 37, Jan. 1952, p. 58-59.

The changeover from a casting to a welded design. Compares the two procedures. Table gives mechanical properties of cast iron and mild steel. (K1, Q general, CI, CN)

99-K. Spot and Projection Welding Using Magnetic Electrode Force. Wm. E. Klingeman and Harold H. Kruer. *Welding Journal,* v. 30, Dec. 1951, p. 1073-1078.

New welding process has made it possible to weld previously difficult and critical applications with a new degree of uniformity. It is mainly being used for the welding of pure silver, coined silver and tungsten electrical contacts, although advantages have also been found for many other applications involving brass, copper, and stainless steel. Diagrams and illustrations.
(K3, Ag, W, Cu, SS)

100-K. The Effect of Power-Supply Characteristics on D. C. Welding. Jack B. Keyte. *Welding Journal,* v. 30, Dec. 1951, p. 1079-1083.

A study of the influence of variations in the slope of the volt-ampere characteristics curve and the machine time constant of a d. c. welding machine on spatter loss, deposition rate, and penetration. Data are diagrammed and graphed. (K1)

101-K. Sigma Welding of Carbon Steels. H. T. Herbst and T. McElrath, Jr. *Welding Journal,* v. 30, Dec. 1951, p. 1084-1091.

Experimentation resulting in the successful welding of carbon steels by the shielded inert-gas metal-arc process achieved by the addition of small amounts of O_2 to the argon gas. Data are tabulated and graphed. (K1, CN)

102-K. Dilution and Diffusion Aspects of Nonfusion Welding. R. D. Wasserman and J. Quaas. *Welding Journal,* v. 30, Dec. 1951, p. 1098-1101.

The science of physicochemical phenomena and thermodynamic data is applied to a better understanding of the brazing processes. Data are diagrammed and tabulated for a wide variety of ferrous and nonferrous alloys. (K8)

103-K. The Welding and Brazing of Copper Alloys. J. Imperati and Ira T. Hook. *Welding Journal,* v. 30, Dec. 1951, p. 1102-1107.

A survey of the more important Cu and Cu alloys, and the welding processes and techniques commonly used. Data are tabulated. (K general, Cu)

104-K. Temperature Distribution During the Flash Welding of Steel. E. F. Nippes, W. F. Savage, J. J. McCarthy, and S. S. Smith. *Welding Journal,* v. 30, Dec. 1951, p. 585s-601s.

Flashing methods are compared on the basis of temperature distribution. How this information may be utilized in selecting flashing variables. Data are graphed and tabulated for welding of SAE 1020 steel. (K3, CN)

105-K. Improvement of Inert-Gas Welding by Using High-Purity Helium. William A. Mays. *Welding Journal,* v. 30, Dec. 1951, p. 602s-606s.

Helium-shielded arc welding process which produces sound, nonporous welds on Al, Mg stainless steel, and many other hard-to-weld metals. Effects of various impurities on the welding of Al, also precautions necessary in handling high-purity He to avoid contamination. (K1, Al, Mg, SS)

106-K. Relation of Notch Strain to Deflection in the Notch-Bend Test. E. M. Emery and A. E. Flanigan. *Welding Journal,* v. 30, Dec. 1951, p. 607s-612s.

An experimental investigation of the strains developed at the base of the notch in a longitudinal notch-bend specimen used for the evaluation of weld ductility. Material was ASTM A285-C steel plate. (K9, CN)

107-K. Microcracks and the Low-Temperature Cooling Rate Embrittlement of Welds. A. E. Flanigan and M. Kaufman. *Welding Journal,* v. 30, Dec. 1951, p. 613s-622s.

Results of tensile, fatigue, and impact tests on mild steel welds. Certain features of the microcracks which are associated with embrittlement produced by too rapid cooling following welding. Diagrams and microphotographs. (K9, Q23, CN)

108-K. The Metallurgical Principles of Stage Welding. Tore Noren. *Machinery Lloyd* (Overseas Ed.), v. 23, Dec. 8, 1951, p. 106-107, 109, 111-114.

New arc welding method applicable to toolsteels base on isothermal transformation principles. It is useful in the repair of high speed steel tools and tools of similar alloys. (K1, TS)

109-K. Welding of Aluminum Alloys by the MATI Method. (In Russian). G. D. Nikiforov. *Avtogennoe Delo,* v. 22, Mar. 1951, p. 1-4.

Equipment and techniques. Recommendations are made for oxy-acetylene welding of various thicknesses of four alloys. (K2, Al)

110-K. Power Sources for Argon-Arc Welding of Aluminum Alloys With Tungsten Electrodes. (In Russian.) L. A. Mordvintsev and E. A. Guseva. *Avtogennoe Delo,* v. 22, Mar. 1951, p. 4-7.

Oscillographic studies were made of the welding currents from different power sources and various auxiliary equipment. Influence of these variables on the welds. (K1, Al)

111-K. The Question of Intercrystalline Corrosion of 18-8 Type Steel During Single-Pass Butt Welding. (In Russian.) A. G. Mazel. *Avtogennoe Delo,* v. 22, Mar. 1951, p. 7-9.

The influence of temperature and duration of heating for various types of welding on corrosion of 18-8 was investigated. Data are tabulated. (K1, R2, SS)

112-K. Test of Metals for Sensitivity to Thermal Cycles of Welding. (In Russian.) E. M. Kuzmak. *Avtogennoe Delo,* v. 22, Mar. 1951, p. 9-11.

Influence of different types of heating and various thermal cycles encountered in arc welding on structural changes of certain steels. Results are charted. (K1, ST)

113-K. Preparation of Ferromanganese for Electrode Coatings. (In Russian.) N. N. Kriukovskii. *Avtogennoe*

Delo, v. 22, Mar. 1951, p. 15-17.

The influence of the fineness of ferromanganese powder on the composition of the deposited metal in welding steel was investigated. Data are discussed and tabulated. (K1, T5, CN, Fe-n)

114-K. Single-Pass, Submerged-Melt Welding of Boiler Steel 10-20 Mm. Thick. (In Russian.) S. E. Sinadskii. *Avtogennoe Delo,* v. 22, Mar. 1951, p. 17-21.

Equipment and techniques of applying flux materials during submerged-melt welding. Influence of various fluxes and welding conditions. Results are charted. (K1, CN)

115-K. Ways of Reducing Porosity of Weld Seams During Automatic Welding of Structural Sections. (In Russian.) A. S. Fal'kevich and V. S. Volodin. *Avtogennoe Delo,* v. 22, Mar. 1951, p. 21-23.

Results of X-ray investigations on steel welds made with fluxes containing different amounts of moisture. (K1, CN)

116-K. Rational Methods of Welding Concrete-Reinforcements for Hydroelectric Structures. (In Russian.) N. L. Kaganov. *Avtogennoe Delo,* v. 22, Apr. 1951, p. 1-4.

Techniques and apparatus for arc and gas welding of concrete reinforcing rods. (K1, K2, CN)

117-K. Mechanization and Automatization of the Processes of Welding Fittings and Networks for Reinforced Concrete. (In Russian.) N. E. Nosenko and V. A. Gorokhov. *Avtogennoe Delo,* v. 22, Apr. 1951, p. 4-7.

Machines for electric welding of reinforcing materials. (K1, CN)

118-K. Investigation of the Equilibrium State of the Metal-Slag System During Welding with TsI-1 Electrodes. (In Russian.) V. A. Lapidus. *Avtogennoe Delo,* v. 22, Apr. 1951, p. 12-15.

Equilibrium conditions in the molten deposit during arc welding of steels with above rods are calculated. Results are tabulated. (K1, ST)

119-K. Equipment of TsNIITMASH [Central Scientific-Research Institute of the Heavy Machine Industry] for Automatic Welding With Three-Phase Current. (In Russian.) I. L. Brinberg. *Avtogennoe Delo,* v. 22, Apr. 1951, p. 15-20.

Equipment is described, diagrammed, and illustrated. Includes circuit diagrams. (K1)

120-K. Is Columbium Necessary in Welding Wire? (In Russian.) I. Z. Kagan. *Avtogennoe Delo,* v. 22, Apr. 1951, p.26-27.

Intergranular corrosion of welded 18-8 steel and the use of Cb in welding of wire. (K1, T5, SS)

121-K. The Use of Salt Baths for Soldering of Metals. (In Russian.) L. E. Fedotov. *Stanki i Instrument,* v. 22, Mar. 1951, p. 33-34.

Briefly described. (K7)

122-K. The Weldability and Mechanical Properties of a Series of Low-Alloy Steels. J. G. Ball and C. L. M. Cottrell. *Journal of the Iron and Steel Institute,* v. 169, Dec. 1951, p. 321-336.

Diagrams indicating the effect of steel composition on weldability were constructed, and compared with others indicating the mechanical strength of the steels in both the normalized and tempered conditions; these comparisons lead to a range of compositions giving the best combination of weldability and mechanical strength. The microstructure of the steels in the normalized condition is related to their weldability, and the effect of tempering temperature after normalizing on the mechanical properties and microstructure of one of the steels was investigated; evidence to support a significant relationship observed has been obtained from a number of the other steels of the series. Table summarizes results. 10 ref. (K9, Q23, AY)

123-K. Spotwelding Structural Aluminum Floor Beams. Gilbert C. Close. *Modern Machine Shop,* v. 24, Jan. 1952, p. 128-130, 132, 134, 136.

Fabrication method results in weight saving. Forming, heat treating, and finishing operations. (K3, T26, Al)

124-K. Stainless Brazed Without Fluxing. F. W. Beall. *Steel,* v. 130, Jan. 14, 1952, p. 57.

Difficulties of furnace brazing stainless steel parts are largely overcome by first plating the parts with a thin coating of iron. (K8, L17, SS)

125-K. A Comparison of Heating Methods for Brazing. Part I. Lester F. Spencer. *Steel Processing,* v. 37, Dec. 1951, p. 617-623.

Advantages of brazed joints which make brazing an ideal method for the joining of metals. Factors to be considered in the brazing methods. (To be continued.) (K8)

126-K. Welding and Soldering Aluminum. (In French and German.) E. Zurbrügg. *Zeitschrift für Schweisstechnik; Journal de la Soudure,* v. 41, Sept. 1951, p. 161-165; Oct. 1951, p. 183-191.

Various methods and conditions for welding Al and its alloys. Graphs show strength data of welded and annealed Al alloys and diagrams illustrate different weld designs. Con-

cluding part emphasizes particularly the advantages of welding under inert gas without flux and characterizes brazing and soldering of Al. (K general, Al)

127-K. Welding of "Aluman" Roofing. (In French and German.) E. Müller. *Zeitschrift für Schweisstechnik; Journal de la Soudure,* v. 41, Dec. 1951, p. 217-222.

Welding of various "Aluman" (Al-Mn alloy) roofing and gutter types. Photographs. (K general, T26, Al)

128-K. (Book) **Resistance Welding Data Book.** Ed. 4. 500 pages. 1952. P. R. Mallory & Co., Inc, Indianapolis, Ind. $3.00.

Separate chapters cover resistance-welding fundamentals, spot, projection, seam, flash, upset, butt, and butt-seam welding, metals to be welded, alloys to be welded, electrodes, die holders, recommended practices, standard testing methods and resistance welds. Numerous photographs, charts, tables, and diagrams. (K3)

129-K. (Book) **The Welding Encyclopedia.** Ed. 13. T. B. Jefferson. 1008 pages. 1951. McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y. $7.50.

Treats every subject which deals in any way with welding, cutting, or related processes. (K general)

130-K. Welding Turbine Shafts and Wheels for Jet Engines. George H. DeGroat. *Machinery* (American), v. 58, Jan. 1952, p. 179-183.

Methods employed at Wright Aeronautical Corp. to meet high-quality specifications. The wheels are made of 16-25-6 Cr-Ni-Mo steels and the shafts of low-alloy steel (0.70% Mn, 1.65-2.0% Ni). Electric-arc welding with a manual flux-coated electrode is used. (K1, SS)

131-K. Large Structures and Heavy Gauge Metals Joined at Ryan With Improved Spot Welding. *Western Metals,* v. 10, Jan. 1952, p. 37-38.

Equipment and procedures. Stainless steels and Al alloys are the principal metals involved. (K3, Al, SS)

132-K. Cold Pressure Welding. *Aero Digest,* v. 64, Jan. 1952, p. 69.

Method which doesn't require heat or electricity. Developed in England, the process is applicable to all nonferrous metals, particularly Al and its alloys. (K5, EG-a, Al)

133-K. Welding Iron-Bearing Alpha Aluminum Bronze. F. Emery Garriott. *Welding Journal,* v. 31, Jan. 1952, p. 18-28.

Tests show that iron-bearing alpha aluminum bronze sheet and plate can satisfactorily be fabricated by the various arc welding processes. Mechanical properties of the weld metal produced by any of these processes are comparable to those of the base metal. (K1, Q general, Cu)

134-K. Product Design for Welding. John Mikulak. *Welding Journal,* v. 31, Jan. 1952, p. 29-34.

Equipment and method for economical automatic welding of moderate quantities on production jobs. Graphs, diagrams, and illustrations. (K1)

135-K. Hints for Silver-Brazing of Stainless Steel. J. P. Emmerich. *Welding Journal,* v. 31, Jan. 1952, p. 50-53. (K8, SS)

136-K. Four at One Blow. *Welding Journal,* v. 31, Jan. 1952, p. 53.

A machine designed by the Thomson Welding Machine Co. that makes four simultaneous spot welds in production of jet-engine combustion chambers. (K3)

137-K. Predetermination of Preheat and Postheat for Submerged-Arc Welding. Clarence E. Jackson and Arthur E. Shrubsall. *Welding Journal,* v. 31, Jan. 1952, p. 1s-10s.

A comparison of the transformation of austenite with continuous cooling, and applications of controlled preheat and postheat treatments in welding alloy steels. Data are graphed. 11 ref. (K1, N8, AY)

138-K. Welding of High-Alloy Castings. R. David Thomas. *Welding Journal,* v. 31, Jan. 1952, p. 27s-32s.

A restrained test plate was devised for evaluation of the quality of welds in 15-35 Cr-Ni castings from the standpoint of freedom from cracks, fine fissures, and other forms of defects. Radiographic examination of the plates will only reveal major defects, but the existence of fine fissures can be determined by cross-sectioning the welds, polishing, and macro-etching. (K9, S13, SS)

139-K. Welded Continuous Frames. Plastic Design and the Deformation of Structures. P. S. Symonds. *Welding Journal,* v. 31, Jan. 1952, p. 33s-36s.

Discussion on the above paper published in July 1951 issue. See item 453-K, 1951. 11 ref. (K9, Q23, T26)

140-K. Stainless-Steel Weld Deposits on Mild and Alloy Steels. Helmut Thielsch. *Welding Journal,* v. 31, Jan. 1952, p. 37s-64s.

A review of published and unpublished information on dissimilar metal joints made with stainless steel electrodes: metallurgical characteristics of joints, dilution, mechanical properties, heat treatments, carbon migration, base steel and weld metal

cracking, hardenable steels, and applications. 114 ref.
(K1, Q general, SS, AY, CN)

141-K. Spot-Welding. *Aircraft Production*, v. 14, Jan. 1952, p. 5.
Semi-automatic equipment for welding gas-turbine combustion chambers. (K3)

142-K. Rubber-Metal Parts. H. H. Hile, E. E. Blaurock, and A. S. Miceli. *Machine Design*, v. 24, Jan. 1952, p. 142-147.
Information on bonding rubber to metal. Bond stresses, type of metals, tolerances, molds, the curing process, and size shrinkage. Diagrammed.
(K11, ST, Ni, Al, Cu, Zn, CI)

143-K. The Fabrication of a Large Gear Guard. J. Floyd. *Sheet Metal Industries*, v. 29, Jan. 1952, p. 21-26.
Details of layout and welding of sheet-metal part. Schematic diagrams. (K1, G1, CN)

144-K. Processes Used in the Bonding of Metals by Means of Synthetic-Resin Adhesives. F. H. Parker. *Sheet Metal Industries*, v. 29, Jan. 1952, p. 63-68.
Equipment and procedures. (K12)

145-K. Industrial Brazing. E. V. Beatson and H. R. Brooker. *Welding and Metal Fabrication*, v. 20, Jan. 1952, p. 2-11.
Methods and equipment. (K8)

146-K. Heavy Fabrication at Redcar. *Welding and Metal Fabrication*, v. 20, Jan. 1952, p. 14-21.
The welding department at the Redcar Works of Dorman, Long & Co., Ltd., and the new fabrication shop. Details of the plant and some typical large weldments produced. (K general, A5)

147-K. Reclamation of Iron Castings by Reinforced Bronze Welding. G. G. Musted. *Welding and Metal Fabrication*, v. 20, Jan. 1952, p. 25-26.
Excellent results can be obtained in the repair and reclamation of defective iron castings intended for high pressures, using oxy-acetylene bronze welding on electric arc sealing runs, the castings being reinforced by steel studs and lengths of mild steel round bar. (K2, CI)

148-K. Welding of Large Aluminium Structures. Recent Researches on the Arc Welding of Thick Aluminium Alloy Plate. P. T. Houldcroft, W. G. Hull, and H. G. Taylor. **Practical Aspects of the Argonarc Welding of Aluminium Alloy.** J. R. Handforth. *Welding and Metal Fabrication*, v. 20, Jan. 1952, p. 27-34; disc., p. 35. (Condensations.)
Includes tables and diagrams.
(K1, Al)

149-K. Spot Welding Results in Lighter Steel Structures. E. Gut. *Brown Boveri Review*, v. 38, July-Aug. 1951, p. 248.
Methods employed in the coach-building industry. (K3)

150-K. Investigation of Argon-Arc and Autogenous Welded Light-Metal Sheets. (In German.) K. Longard. *Metall*, v. 5, Dec. 1951, p. 538-539.
Results of hardness, tensile, and bending test are tabulated and charted. Photomicrographs show comparative weld microstructures. 99.5% Al and four Al alloys were tested.
(K1, Q27, Q29, Q5, Al)

151-K. Free Flowing Temperature of Silver Solder. (In German.) O. Loebich. *Metall*, v. 5, Dec. 1951, p. 548-550.
Importance of finding the free-flowing temperature for the workpiece in order to assure quality soldering. (K7, Ag)

152-K. Control System for Induction Heaters. *Electronics*, v. 25, Feb. 1952, p. 194, 198, 202. (Condensed from "Induction Heater Control System," R. W. Ketchledge, *Bell System Technical Journal*, Sept. 1951.)
When silver soldering or brazing near rubber or plastic insulation, the operation should be completed as rapidly as possible to avoid damage to the insulation and to the parts being brazed or soldered. The control system described reduces the power when the desired temperature has been reached and disconnects the power when the braze is completed. (K8, S18)

153-K. Navy Investigates Weld Fracture Problems. *Industry & Welding*, v. 25, Feb. 1952, p. 39, 71.
Explosion-bulge testing of welds in heavy steel plate provides relatively low-cost method of evaluating structural performance and furnishes basic information needed for investigation of the weld-fracture problem. (K9, CN)

154-K. Automatic Submerged Arc Unit Speeds Production. *Industry & Welding*, v. 25, Feb. 1952, p. 35-36, 70-71.
Welding unit used for varied applications in manufacture of low-pressure firetube boilers, tanks, pressure vessels, etc., by Farrar & Trefts, Inc., Buffalo. (K1, CN)

155-K. How Welding Repaired 44 Cracks in Cast Steel. J. S. Walsh. *Industry & Welding*, v. 25, Feb. 1952, p. 44, 47, 73-74.
As applied to a 2500-ton press platen. (K general, CI)

156-K. Inert Arc Process Fabricates Aluminum Boxes 20 Percent Faster. *Industry & Welding*, v. 25, Feb. 1952, p. 68, 70-71.
The process and its advantages. It is applied to traffic-signal-control cabinets by Eagle Signal Corp., Moline, Ill. (K1, Al)

157-K. Controlled Spot Welds Improve Aircraft Production. Gilbert C. Close. *Industry & Welding,* v. 25, Feb. 1952, p. 50-52, 55, 88-90.

Work at Northrup Aircraft. Inspection procedures are emphasized. (K3, S13, Al)

158-K. Rotating Jigs Speed Welding. *Industry & Welding,* v, 25, Feb. 1952, p. 74.

Process at Boardman Co., Oklahoma City, where downhand welding of heavy steel equipment is facilitated by use of rotating jigs. (K1, ST)

159-K. The Cause and Cure of Troubles in Stainless and Alloy Welding. *Industry & Welding,* v. 25, Feb. 1952, p. 76-80.

Welding data in tabulated form under the headings trouble, cause, suggested correction. (K general, SS, AY)

160-K. Welding and Riveting Larger Structures. *Light Metals,* v. 15, Jan. 1952, p. 37-38.

Discusses four papers presented at a symposium of the Aluminium Development Assn. Confined to Al structures. (K general, Al)

161-K. Welding With Inert Gases. *Machine and Tool Blue Book,* v. 48, Feb. 1952, p. 109, 110, 112-114.

Advantages and applications. Current densities must be increased to 12 times that required for equivalent types of ordinary metal-arc welding. (K1)

162-K. Progress in the Welding Industry. B. Karnisky. *Metal Progress,* v. 61, Jan. 1952, p. 59-63.

Reviews some of the highlights of the past. Enumerates some of the basic problems still to be solved. (K general)

163-K. Engineering Uses for Rubber Adhesives. R. S. Piper. *Product Engineering,* v. 23, Feb. 1952, p. 130-133.

Application techniques and comparison of properties of various rubbers. Includes use for metal bonding. (K12)

164-K. Flux Bath Dip Brazing of Aluminum Alloys. D. Wallace. *Product Engineering,* v. 23, Feb. 1952, p. 173-175.

Properties and suitability of various Al alloys for brazing. Details of brazing process, stressing melting temperatures and mechanical properties of the filler and base metal. (K8, Al)

165-K. How to Get More Out of Resistance Welding Control. *Steel,* v. 130, Jan. 28, 1952, p. 68-69, 81.

Advantages of the ignitron for extending welding equipment to handle heavier loads. Data are charted; circuits diagrammed. (K3)

166-K. A Comparison of Heating Methods for Brazing. Part II. Lester F. Spencer. *Steel Processing,* v. 38, Jan. 1952, p. 29-34.

Various methods available in brazing of ferrous and nonferrous assemblies. Includes induction heating, torch, furnace, salt bath, radiant gas, and resistance brazing. (K8, Fe, ST)

167-K. Properties and Applications of Adhesives for Metals. (In French.) J. J. Meynis de Paulin. *Revue de l'Aluminium,* v. 28, Nov. 1951, p. 403-406.

Surface preparation, joint resistance, and behavior with water and solvents. A table sums up characteristics of the various bonding agents for metals and gives hints on their practical use. (K12)

168-K. Spot Welding of Semi-Hard Low Alloy Steel; Critical Study Concerning the Influence of Different Welding Parameters on the Quality of the Spots. (In French.) P. Joumat. *Soudure et Techniques connexes,* v. 5, Sept.-Oct. 1951, p. 224-232; Nov.-Dec. 1951, p. 267-276.

Influence of intensity and duration of different parameters on macrostructure and microstructure, as well as on certain mechanical properties of spot welds in steel plate were investigated. Part 2: Effects of regulation of tempering, preheating, and pressure. Results are shown graphically. Includes micrographs and macrographs. (K3, AY)

169-K. A Solution to the Problem of Semi-Automatic Welding Under Flux. (In French.) J. Petit. *Soudure et Techniques connexes,* v. 5, Nov.-Dec. 1951, p. 241-246; disc. 246-247.

A semi-automatic apparatus which makes it possible to have either continuous or discontinuous feeding of powder. Includes photographs. (K1)

170-K. Wire Soldering Fixture. W. M. Halliday. *Machinery,* (American), v. 58, Feb. 1952, p. 205-207.

Joint had to be made as strong as possible, but with the smallest amount of excess solder deposited around the joint. Material was steel. (K7, ST)

171-K. Fabricating a Large Welded Pipeline. T. G. Scott Field. *Machinery Lloyd* (Overseas Edition), v. 24, Jan. 9, 1952, p. 85-86.

Problems encountered. (K general, CN)

172-K. Carbon Steels Successfully Welded by Inert-Gas-Shielded Metal-Arc Process. H. T. Herbst and T. McElrath, Jr., *Materials & Methods,* v. 35, Feb. 1952, p. 86-87.

New argon-oxygen mixture containing approximately 5% O_2 and 95% A (marked at Linde argon-

sigma grade), permits welding at high speeds without undercutting, improves coalescence of the weld metal at increased welding speeds, and provides good stability and low spatter rate. (K1, CN)

173-K. Longest, Largest Line Laid in Galveston Bay. Frank H. Love. *Petroleum Engineer,* v. 24, Feb. 1952, p. D3-D6.

Construction of pipeline, including coatings for protection against marine attack and welding procedure. (K general, L26, ST)

174-K. A Survey of Modern Theory on Welding and Weldability. (Continued). D. Serferian. *Sheet Metal Industries,* v. 29, Jan. 1952, p. 53-61.

Weldability of cast irons; oxyacetylene welding of gray cast iron; arc welding of cast iron; and weld-brazing of steels and cast irons. Graphs and micrographs. (To be continued). (K9, CI, ST)

175-K. The Welding of the Wrought Light Alloys. *Transactions of the Institute of Welding,* v. 14, Oct. 1951, p. 169-172.

A discussion of papers on the above published in the Aug. 1951 issue. (K general, Al, Mg)

176-K. Recent Developments in Welding in Great Britain. *Transactions of the Institute of Welding,* v. 14, Oct. 1951, p. 173-176.

A discussion of papers published in the June 1951 issue. (K general)

177-K. Welding Jets at Solar Aircraft. Clyde B. Clason. *Welding Engineer,* v. 37, Feb. 1952, p. 17-21.

Conveyor-line assembly, inspection methods, materials and welding methods, including practically every major process, in use at new Solar plants. Most jet-engine parts are fabricated from 347 (Co-stabilized) stainless steel, Inconel and Inconel "X." (K general, SS, Ni)

178-K. Welding the High-Heat-Resistant Materials. J. L. Solomon. *Welding Engineer,* v. 37, Feb. 1952, p. 38-42.

Problems involved in welding alloys capable of withstanding service temperatures around 1800-1900° F. (K general, SG-h)

179-K. (Book) Electronic Motor and Welder Controls. George M. Chute. 347 pages. McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y.

Improved electrical circuits. Includes a variety of closed-cycle, motor-control systems. The stable operation of such motors. (K1, K3)

180-K. (Book) Werkstoff und Schweissung. Handbuch für die Werkstoff-und Werkstoffbedingte Verfahrenstechnik der Schweissung. (Materials and Welding. Handbook on Materials and Techniques of Welding). Friedrich Erdmann-Jesnitzer. 1003 pages. 1951. Akademie-Verlag, 19 Schiffbauerdamm, Berlin, N.W. 7, Germany. 160 DM.

Covers the field of ferrous metals, including production, rolling, weldability and other properties of sheet steels, principles and special welding methods, and design of welded structures. Includes tables, graphs, diagrams, photographs, photomicrographs, and numerous references. (K general, ST)

181-K. Glass Tube Technology. 1. Glass-to-Metal Seals. Peter Whibley. *Engineering Experiment Station News* (Ohio State University), v. 23, Dec. 1951, p. 48-51, 55-56.

Data on metal and glasses suitable for sealing. Stresses resulting from differential contraction between glass and metal. (K11, Q25)

182-K. Increase in Adhesion of Shrink Fits by Surface Oxidation. F. Wenck. *Engineers' Digest,* v. 13, Jan. 1952, p. 13-15, 28. (Translated and condensed from *Werkstattstechnik und Maschinenbau,* v. 41, Sept. 1951, p. 359-361.)

Influence of surface layers on shrink fits subjected to torsional load. Evidence is submitted on the decrease of adhesion due to oil films on the steel surfaces and on the increase due to oxide layers. (K13, ST)

183-K. Welding Magnesium Alloys. *Magazine of Magnesium,* Feb. 1952, p. 1-7.

Mg and all of its commonly used alloys can be welded by gas, arc, and electric resistance methods. The different methods of welding, and some of the important characteristics of Mg which affect welding. (K general, Mg)

184-K. Some Details of Multi-Spot Welding Technique as Practised at the Luton Plant of Vauxhall Motors Ltd. A. J. Newson. *Sheet Metal Industries,* v. 29, Feb. 1952, p. 149-157.

Includes a brief outline of press welding and the possibilities of this method of production. Diagrams. (K3)

185-K. Thoriated-Tungsten Electrodes—Their Welding Cnaracteristics and Applications. G. J. Gibson and R. O. Seitz. *Welding Journal,* v. 31, Feb. 1952, p. 102-108.

The theory of arc welding is examined to determine the difference between the action of thoriated and pure-tungsten electrodes. Application to various ferrous and nonferrous metals and alloys. Data are charted and tabulated. (K1, T5)

186-K. Flash Welding of Components for Aircraft and Similar Applications.

J. H. Cooper. *Welding Journal,* v. 31, Feb. 1952, p. 109-115.

Process characteristics. The greater proportion of the materials welded are a group of related alloy steels such as SAE 4130, 4135, 4140, 4340, 8740; AMS steels 6371, 6324, 6413, 6359-A, etc. (K3, AY)

187-K. How to Braze Weld Cast Iron. H. D. Drummond. *Welding Journal,* v. 31, Feb. 1952, p. 148-151.

Outlines procedure. (K8, CI)

188-K. A Study of the Fatigue Strength of Welded Joints. *Welding Journal,* v. 31, Feb. 1952, p. 100s-103s. (Translated and condensed from "Fatigue Strength of Welded Assemblies," W. Soete and R. Van Crombrugge.)

Previously abstracted from *Revue de la Soudure; Lastijdschrift.* See item 593-K, 1951. (K9, Q7, ST)

189-K. The Practical Testing of the Cohesive Strength and Weldability of Steels. W. A. Felix. *Welding Journal,* v. 31, Feb. 1952, p. 105s-111s.

Various testing methods employed for investigating the suitability of a steel for use in highly stressed welded structures. (K9, S1)

190-K. Report of Special Committee on Continuous Welded Rail. H. B. Christianson, chairman. *American Railway Engineering Association Bulletin,* v. 53, Feb. 1952, p. 683-693.

Fabrication, laying, fastenings, and maintenance. Subcommittee reports on each topic. (K general, T23, CN)

191-K. Guided Bend Qualification Test. R. G. Alison. *Canadian Metals,* v. 15, Feb. 1952, p. 40, 42.

Electrode and plate materials as factors in the success of the test. (K9, ST)

192-K. Oxy-Argon Mixture for Improved Sigma Welding. *Canadian Metals,* v. 15, Feb. 1952, p. 54.

Lower current densities, more economical rods, and welding of thinner materials. Use improves the welding of stainless and carbon steels. (K1, SS, CN)

193-K. Fabricated Ingot Cars Stand Up Under Severe Operating Conditions. R. G. Fournie. *Iron Age,* v. 169, Feb. 28, 1952, p. 112-114.

Arc welding procedures for plain carbon steel cars designed to withstand severe impact loads at elevated temperatures. (K1, CN)

194-K. Fabrication of Aluminum "Skybeams". *Light Metal Age,* Feb. 1952, p. 8-9.

Spot welding of structural Al floor beams of remarkably high strength-weight characteristics, by Ryan Aeronautical Co. 1000 weightless spot welds are employed in each of the I-beams which support the cargo-carrying floors of the big Boeing C-97 Strato-Freighter. (K3, T24, Al)

195-K. Welded Fixtures Expedite Machining of Die Castings. Herb Downing. *Machine and Tool Blue Book,* v. 48, March 1952, p. 235-236, 238, 242, 244.

Fixtures are assembled by arc welding. (K1, G17)

196-K. Resistance Welding Operations on Girling Shock Absorbers. *Machinery* (London), v. 80, Feb. 7, 1952, p. 229-232.

Welding machines work on a 2-phase balanced load system, and the welding cycle is controlled by ignition equipment providing phase-shift heat regulation, the heating time being approximately 0.1 sec. (K3, ST)

197-K. Nested Electrode Welding. *Metal Progress,* v. 62, Feb. 1952, p. 150, 152. (Condensed from "Nested Electrodes for Metal Arc Welding", William A. Snyder.)

Previously abstracted from *Welding Journal.* See item 23-K, 1952. (K1)

198-K. Welding Facilitates Construction of Refrigerated Carbonating Equipment. *Refrigerating Engineering,* v. 60, Feb. 1952, p. 153, 190.

Welding of a stainless steel cooling unit and tank with hand or automatic hidden-arc equipment. (K1, SS)

199-K. Notes on Soldering. Lester F. Spencer. *Sheet Metal Worker,* v. 43, Feb. 1952, p. 33, 49-50.

Nominal composition of various alloys, and their melting range. Various uses of each. (K7, SG-f)

200-K. How Welding Can Assist in Achieving Metal Economy. J. W. Shedden. *Welder,* v. 20, July-Dec. 1951, p. 27-31.

The raw-materials position, and savings of metal by changes to welded designs. 12 ref. (K general)

201-K. The Restoration of Mill Hammers by Welding. L. G. Kent. *Welder,* v. 20, July-Dec. 1951, p. 33-34. (K general, CN)

202-K. Recent Developments in the Welding of Steam Locomotive Components. H. H. Mackintosh. *Welder,* v. 20, July-Dec. 1951, p. 35-37.

Brief discussion and illustrations. (K general, T23, CN)

203-K. The Design and Fabrication of Welded Structures Subjected to Repeated Loading. Part VIII. *Welder,* v. 20, July-Dec. 1951, p. 38-41.

Compares properties of butt welds and reinforced butt welds; effect of shape and machining on fatigue

strength of straps attached by fillet welds. (To be continued)
(K general, Q7, CN)

204-K. The New Murex Cleat Jig. *Welder,* v. 20, July-Dec. 1951, p. 42-44.
Advantages of joining steel parts by welding instead of riveting or bolting. (K general, ST)

205-K. Building Jaguar Sports Cars. *Welding and Metal Fabrication,* v. 20, Feb. 1952, p. 44-48.
Various welding, brazing, and pressing operations.
(K general, G1, CN)

206-K. Industrial Brazing. Heating Methods and Equipment. E. V. Beatson and H. R. Brooker. *Welding and Metal Fabrication,* v. 20, Feb. 1952, p. 54-58.
Various types of furnaces and furnace atmospheres for brazing. Graphs and tabular data. (To be continued.) (K8)

207-K. Some Aspects of Prefabrication in Ship Construction. N. G. Eckerbom. *Welding and Metal Fabrication,* v. 20, Feb. 1952, p. 63-69.
Emphasis is on welding, design, and scheduling.
(K general, T22, CN)

208-K. Making Satisfactory Welded Joints in Wire by Resistance Welding. *Wire and Wire Products,* v. 27, Feb. 1952, p. 161-163, 210-213.
The underlying principles and factors that should be understood if welded joints of optimum quality are to be produced. Materials considered are cold and hot drawn low-carbon steel wire. (K3, ST)

209-K. High-Temperature Welded Joints. R. H. English. *Australasian Engineer,* Jan. 7, 1952, p. 147-151.
Previously abstracted from *Welding Journal.* See item 619-K, 1951. (K1, SS, SG-h)

210-K. Welding Jet Engine Parts of Heat Resistant Metals. J. L. Solomon. *Automotive Industries,* v. 106, Mar. 1, 1952, p. 41, 58.
Fabrication of jet-engine parts composed of mild steel with Al coating, Ni alloys, W-bearing austenite, stainless, Ti, and martensitic stainless. Problem of welding similar materials having different rates of thermal conductivity.
(K general, CN, Ni, Ti, SS, Al)

211-K. Silicone Rubber Can Now Be Bonded. Robert Smith-Johannsen. *General Electric Review,* v. 55, Mar. 1952, p. 54-57.
Includes tabular data showing what silicone to use for specific adhesive purposes for glass, ceramics, and metals. (K12)

212-K. Fastening Heavy Parts by Stud Welding. *Industry and Power,* v. 62, Mar. 1952, p. 95.
A brief discussion of the process. (K1)

213-K. Induction Heater Cuts Tool Costs. Elroy Fellwock. *Iron Age,* v. 169, Mar. 6, 1952, p. 223.
Repair of broken carbide tools by electronic induction brazing at 55-75% below the cost of replacing damaged tools with new ones. (K8, C-n)

214-K. Production Problems. XIII: Welding of Tractor Steering Wheels. *Iron & Steel,* v. 25, Feb. 1952, p. 46-48, 61.
The three spokes of steel tractor wheels were joined to the center boss by projection welding. An investigation was made of the failure in the brittle zone adjacent to the weld but not in the weld itself, and failure in the actual weld. Micrographs. (To be continued)
(K3, Q23, ST)

215-K. Welding Aluminum Ship Structures. *Marine Engineering and Shipping Review,* v. 57, Mar. 1952, p. 86.
Some aspects to be considered.
(K general, T22, Al)

216-K. Progress in Welding Light Alloys. P. T. Houldcroft. *Metallurgia,* v. 45, Feb. 1952, p. 81-84.
Development of the gas-shielded arc welding process which uses consumable electrodes. Improved materials. 11 ref. (K1, Al, Mg)

217-K. Spot Welding in Aircraft Assembly. *Modern Metals,* v. 8, Feb. 1952, p. 37-38.
Techniques used by the Ryan Aeronautical Co., San Diego, Calif. Describes "Raco 220", a non-abrasive cleaner for Al. (K3, L12, Al)

218-K. Welded Construction Reduces Pump Weight. *Product Engineering,* v. 23, Mar. 1952, p. 142-143.
New 500-hp. slush pump using a welded steel design to reduce weight without sacrificing strength or performance. (K general, ST)

219-K. Spot Welding Highly Stressed Aluminum and Magnesium Assemblies. A. Schoellerman and S. Jenkins. *Product Engineering,* v. 23, Mar. 1952, p. 185-188.
Design considerations, mechanical properties, weldability of Al alloy combinations, and weld spacing and dimensions for Al and Mg assemblies. (K3, Q general, Al, Mg)

220-K. Welding Procedures for Copper-Base Alloys. Lester F. Spencer. *Welding Engineer,* v. 37, Mar. 1952, p. 17-22.
Preliminary considerations such as joint preparation, back-up bars, etc., and the fusion welding of pure Cu, Be-Cu, and the Cu-Zn alloys. (To be continued.) (K general, Cu)

221-K. Stud Welding Freight Cars. *Welding Engineer,* v. 37, Mar. 1952, p. 30-31, 34.

The process and its advantages. (K1, CN)

222-K. Better Dipper Sticks by Submerged-Arc Welding. *Welding Engineer,* v. 37, Mar. 1952, p. 32-34.

Welding of power-shovel parts which involves welding of tubes 20 in. in diam. and up to 45 ft. long with mobile apparatus. (K1, CN)

223-K. Houston's New Welded Office Building. T. B. Jefferson. *Welding Engineer,* v. 37, Mar. 1952, p. 35-37.

Operations and problems in construction of 22-story welded steel structures. (K1, T26, CN)

224-K. Designing a Welded Bucket Dredge. (In German.) Raimund Pertusini. *Schweisstechnik,* v. 5, Dec. 1951, p. 133-136.

Considerable material can be saved by welding, rather than riveting or casting, the parts of a dredge. (K general, T4, CN)

225-K. Outside Shell Assemblies. (In German.) Raimund Pertusini. *Schweisstechnik,* v. 5, Dec. 1951, p. 137-138.

Cost studies of the assembling of ship shells by riveting, fillet welding, shot welding, and spot welding show that spot welding is by far the cheapest method of assembling the shell parts. Diagrams and tables. (K general, K3. CN)

226-K. Use of Steel in Pressure Pipe Lines. (In French.) D. Cecchi. *L'Ossature Métallique,* v. 16, Dec. 1951, p. 580-582.

Italian work, especially in connection with arc welding of steel pipes. Macrographs show structures of the weld zones. (K1, M28, CN)

227-K. Welding of High-Alloy Acid-Proof, and Non-Scaling Ferritic and Austenitic Steels. (In German.) Ernst Klosse. *Chemie-Ingenieur-Technik,* v. 24, Jan. 1952, p. 12-18.

General rules for the weldability of the various types mainly used in the chemical industry. (K9, SS)

228-K. Suitability of Steels for the Flash-Butt Welding Method. (In German.) Erich Hormann. *Stahl und Eisen,* v. 72, Jan. 3, 1952, p. 19-24.

Examples of material and time savings by application of above process to complex sections. Effects of welding conditions on tensile strength and bending angle of flash welded tubes of hydrogen-resistant steels. Application of inert-gas-shielded arc welding to Cr and Mo steels. Occurrence of microcracks near the weld. Micrographs and macrographs. (K3, K1, Q general, AY, SS)

229-K. Deformation During Welding of Structures of High Buildings. (In Russian.) A. D. Zevin. *Avtogennoe Delo,* v. 22, May 1951, p. 3-6.

Experiments were made with aim of reducing the influence of deformation during welding on the building structures. (K general, T26, CN)

230-K. Automatic Welding of Edge Seams With a Carbon Arc Stabilized With a Jet of CO_2. (In Russian.) N. G. Ostapenko. *Avtogennoe Delo,* v. 22, May 1951, p. 6-9.

The conditions for satisfactory application of the method to carbon steels. (K1, CN)

231-K. Weldability of Aluminum-Magnesium Alloy. (In Russian.) S. V. Avakian and N. F. Lashko. *Avtogennoe Delo,* v. 22, May 1951, p. 9-13.

A study was made of welds in Al-Mg alloys. The formation of porosity and structural changes occurring during various heating and cooling cycles were investigated. (K9, Al)

232-K. La Construccion Mecanica Soldada. (Welded Machine Construction.) *Instituto de la Soldadura* (Madrid), Publication 20, 1951, p. 27-40.

Reasons which determine the choice of welding technique to be used in construction of machines, details to be considered in drawing up plans and directing their execution, and the technological study of arc welding electrodes. Photographs and sketches. (K general, K1)

233-K. Progreso de la Soldadura. (Developments in Welding.) F. Guyot. *Instituto de la Soldadura* (Madrid), Publication 20, 1951, p. 5-26.

A general review, covering various aspects such as base metal, weldability, electrodes for arc welding, and various welding processes (arc welding, gas welding, resistance welding, and hard soldering). Tables, diagrams, photographs, and charts. (K general)

234-K. Induction Brazes Squirrel Cage. P. H. Brace and E. B. Fitzgerald. *American Machinist,* v. 96, Mar. 17, 1952, p. 124-125.

High-power generator, a new powdered flux, and a simple set-up combine to braze copper bars to rotor rings automatically in a 4-min. operation. An "unbrazing" technique was also developed. (K8, Cu)

235-K. Carbon Black Flocculation in Rubber to Metal Cements. G. M. Sheehan, Gerard Kraus, and A. B. Conciatori. *Industrial and Engineering Chemistry,* v. 44, Mar. 1952, p. 580-582.

The function of carbon black in cements for adhering rubber to metal. Cements containing GR-S and carbon black as the main constitu-

ents considerably increase adhesion of rubber to brass and to steel coated with various resinous primers, provided the carbon black is strongly flocculated. Data are tabulated. 11 ref. (K11, ST, Cu)

236-K. How to Weld Monel, Nickel and Inconel. *Industry & Welding,* v. 25, Feb. 1952, p. 41-42.

Fabrication of pipe, tubes, and wrought welded fittings of Ni and high-Ni alloys. (K general, Ni)

237-K. Titanium Aids Silver Brazing. Arnold S. Rose. *Iron Age,* v. 169, Mar. 20, 1952, p. 96-97.

Nonbrazing qualities of Ti have proved helpful in silver soldering a type 321 stainless steel assembly in fused KCl-NaCl bath. Ti strips around the assembly act as dams and hold the silver solder in place. The salt bath operates at 1350° F. Rings must be replaced after 25 hr. exposure. (K8, T5, SS, Ti)

238-K. Production Problems. XIII. Welding of Tractor Steering Wheels. *Iron & Steel,* v. 25, Mar. 1952, p. 89-92. (Concluded).

Detailed results of the examination of defective joints. Photomicrographs. (K general, Q general, CN)

239-K. Welded Gear Blanks. Kenneth N. Mills. *Machine Design,* v. 24, Mar. 1952, p. 141-142, 194.

Typical blanks consist of a medium-carbon (SAE 1045) steel rim, structural steel plate webs, and a low-carbon steel hub, joined by submerged-arc welding. (K1, CN)

240-K. Discussion on Resistance Welding. H. E. Dixon and H. G. Taylor. *Sheet Metal Industries,* v. 29, Mar. 1952, p. 249-254.

Discussion of paper presented at the annual conference of the Sheet and Strip Metal Users' Technical Association, published in the Dec. issue of *Sheet Metal Industries* (item 62-K, 1952). (K3)

241-K. Bigger Welders Do Bigger Job. *Steel,* v. 130, Mar. 17, 1952, p. 91-92.

Technical advances in special extra-large-size spot welding equipment developed by Ryan Aeronautical Co. Advantages and examples. (K3)

242-K. Fabrication of Chemical Plant. *Welding and Metal Fabrication,* v. 20, Mar. 1952, p. 82-90.

Welding and construction procedures at a British plant. Includes miscellaneous forming and welding procedures on a variety of equipment, much of it of stainless steel. (K general, G general, T29, SS, ST)

243-K. Industrial Brazing. Part 3. Heating Methods and Equipment. E. V. Beatson and H. R. Brooker. *Welding and Metal Fabrication,* v. 20, Mar. 1952, p. 103-109.

Carbon resistance heating, electrode carbons, direct interface resistance heating, electrode materials for interface resistance brazing, gas-fired salt baths, and electrically heated salt baths. Diagrams, graphs, and tabular data. (K8)

244-K. Practical Aspects of Welding and Metalworking. *Welding and Metal Fabrication,* v. 20, Mar. 1952, p. 113-114.

The welding of galvanized metals by either metallic-arc or carbon-arc welding. (K1, CN, Zn)

245-K. Projection Welding of Steel in Heavy Gages and in Dissimilar Thicknesses. Ernest F. Nippes and John M. Gerken. *Welding Journal,* v. 31, Mar. 1952, p. 113s-124s; disc., p. 124s-125s.

Effects of weld current, weld time, electrode force, and projection dimensions on weld formation and weld quality in projection welding. Graphs and tabular data. (K3, ST)

246-K. Welded Joints Between Dissimilar Metals in High Temperature Service. R. W. Emerson and W. R. Hutchinson. *Welding Journal,* v. 31, Mar. 1952, p. 126s-141s.

Effects of time and temperature on the structural stability of welded joints between austenitic and ferritic steels using austenitic electrodes. Test plates were tested for mechanical properties after specific heat treatments and metallographic observations. Graphs and photomicrographs.
(K1, Q general, M27, SS, AY)

247-K. Investigation of Factors Which Determine Performance of Weldments. R. H. Aborn. *Welding Journal,* v. 31, Mar. 1952, p. 141s, 160s.

Discussion of paper by C. E. Hartbower and W. S. Pellini, published in Oct. 1951 issue (item 621-K, 1951). (K9, Q26, ST)

248-K. Seam Welding Containers Automatically. R. H. Blair. *Welding Journal,* v. 31, Mar. 1952, p. 207.

A discussion of paper by C. S. Seltzer, Sept. 1951 issue (item 563-K, 1951). (K3, CN)

249-K. Schlieren Analysis of Inert-Gas Arc Shields. W. B. Moen and G. J. Gibson. *Welding Journal,* v. 31, Mar. 1952, p. 208-213.

The schlieren method of making gas flow patterns visible was applied to a comparison study of He and A as arc shields with non-consumable electrode equipment. Results indicate that either gas will

provide adequate coverage and the choice of gas depends only upon the desired electrical characteristics and economics. The schlieren apparatus. (K1)

250-K. Resistance and Fusion Welding of Titanium and Its Alloys. E. F. Holt and W. H. Moore. *Welding Journal,* v. 31, Mar. 1952, p. 213-216.

Some preliminary data on properties of Ti and its alloys; techniques for spot, flash, and inert-arc welding. Tabular data and photomicrographs. 14 ref.
(K1, K3, Q general, Ti)

251-K. Flash Butt Welding of High-Temperature Alloys. I. A. Oehler. *Welding Journal,* v. 31, Mar. 1952, p. 230-232.

Flash-butt welding, a common high-production method of joining carbon steels, is readily applicable to joining of the various heat resistant alloys and nonferrous materials used in jet-engine production. Electrical and mechanical requirements for various joint sections. Typical flash welding specifications covering certification of equipment and production control. (K3, SG-h)

252-K. Welding of High Heat-Resistant Materials. J. L. Solomon. *Welding Journal,* v. 31, Mar. 1952, p. 233-238.

See abstract of "Welding Jet Engine Parts of Heat Resistant Metals," J. L. Solomon, *Automotive Industries;* item 210-K, 1952.
(K general, CN, Ni, Ti, SS, Al)

253-K. New-Type Aluminum Hatch Covers Fabricated by Sigma Welding. W. F. Ruehl. *Welding Journal,* v. 31, Mar. 1952, p. 240-241.
(K1, Al)

254-K. Butt Welding of Rail Joints. (In French.) Ed. Henrion. *Revue de la Soudure; Lastijdschrift,* v. 7, no. 4, 1951, p. 195-204.

Recommended procedures, using the oxy-acetylene torch. (K2, CN)

255-K. Welding and Brazing of Gray Iron Castings. (In French and German.) Hans Spycher. *Zeitschrift für Schweisstechnik; Journal de la Soudure,* v. 42, Jan. 1952, p. 7-12.

Various types of operations suitable for the repair of gray-iron castings. The method varies according to the part to be repaired. Details concerning the material and the procedure. (K general, CI)

256-K. Welding of Rails in the Swedish State Railways. (In French and German.) S. E. Schäder and S. E. Jönsson. *Zeitschrift für Schweisstechnik; Journal de la Soudre,* v. 42, Jan. 1952, p. 1-4; Feb. 1952, p. 23-32.

Training and examinations required for the welders, and the types of welding done. Methods of operation. (K1, CN)

257-K. The Present Status of Electric Resistance Welding. (In German.) E. Rietsch. *Schweissen und Schneiden,* v. 3, Dec. 1951, p. 376-382.

Modern equipment, particularly spot welding machines, seam welders, butt welders, and electrode materials. Operation of the machines. 10 ref. (K3)

258-K. Welding in Machine Construction. (In German.) F. W. Griese. *Schweissen und Schneiden,* v. 4, Jan. 1952, p. 6-18.

Wide possibilities for use of welding to achieve cost reduction. Photographs and diagrams. 10 ref.
(K general)

259-K. Calculation and Design of Welded Structures. (In German.) K. H. Effertz. *Shcweissen und Schneiden,* v. 4, Jan. 1952, p. 19-21; Feb. 1952, p. 56-58.

First articles of a series. Numerous diagrams. (K general, T26)

260-K. Development of Electrodes for Welding of Austenitic Steels for High-Pressure Boilers. (In German.) E. Kauhausen and H. A. Vogels. *Schweissen und Schneiden,* v. 4, Feb. 1952, p. 35-40.

Development of an austenitic electrode, free of ferrite, which can be used for welding even very thick sheets. With respect to heat resistance, intercrystalline corrosion, and embrittlement resistance, these welds are of the same quality as the base material. Tables, charts, and photographs. (K1, SS)

261-K. The Soldering of Aluminum. (In German.) L. Rostosky and H. Klein. *Schweissen und Schneiden,* v. 4, Feb. 1952, p. 42-45.

Various brazing and soldering methods for aluminum in industrial and household applications.
(K7, K8, Al)

262-K. Reactance Load and Connected Load of Arc Welding Transformers. (In German.) E. Bergmann. *Schweissen und Schneiden,* v. 4, Feb. 1952, p. 45-50.

Possibility of further development of arc welding transformers. A review of various types shows the effects they have on the operation, as well as the technical possibilities which have already been explored. Schematic diagrams. (K1)

263-K. Progress in the Field of Welding and Cutting: Present Status of Welding Technique in the Soviet Union. (In German.) O. Vollenbruck.

Schweissen und Schneiden, v. 4, Feb. 1952, p. 58-61.

A review on the basis of the literature. Types of welding, of testing, and methods for prevention of cracking. 20 ref. (K general, G22)

264-K. The Production of Chains With Aid of Electric Resistance Welding. (In German.) W. Püngel. *Schweisstechnik,* v. 5, Nov. 1951, p. 121-124.

Advantages of the method; emphasizes particularly the application to chains made of special steels. Micrographs, photographs, and schematic drawings. (K3, ST)

265-K. Solid Ceramic Fluxes for Automatic Welding. (In Russian.) K. K. Khrenov and D. M. Kushnerev. *Avtogennoe Delo,* v. 22, June 1951, p. 1-4.

A series of fluxes which are particularly useful for welding corroded surfaces and for welding or building up low-alloy steels. (K1, AY)

266-K. Influence of Variations in the Composition of High-Manganese Flux on Its Properties. (In Russian.) K. V. Liubavskii and M. M. Timofeev. *Avtogennoe Delo,* v. 22, June 1951, p. 5-9.

Investigation was applied to welding of carbon steels. Compositions of the fluxes and deposits are tabulated. Effects of various compositions. (K1, CN)

267-K. Adherence of Slag Scale to the Surface of the Metal Seam During Welding Under Flux. (In Russian.) D. M. Rabkin, Iu. N. Gotal'skii, E. S. Kudelia, and V. V. Podgaetskii. *Avtogennoe Delo,* v. 22, June 1951, p. 10-14.

Causes of slag adherence to carbon steels were investigated. Crystal structures of the flux and of the oxidized surface of the metal. Data are tabulated and illustrated. 15 ref. (K1, M26, CN)

268-K. Investigation of a Standard Series of Tips for Welding Torches. (In Russian.) V. D. Nechaev. *Avtogennoe Delo,* v. 22, June 1951, p. 14-18.

Characteristics and capacities of a matched series of welding tips. Data are tabulated and charted. (K2)

269-K. Electric-Arc Welding With a Bundle of Electrodes. (In Russian.) V. S. Volodin. *Avtogennoe Delo,* v. 22, June 1951, p. 18-21.

Method of welding carbon steels. The use of two or three electrodes at once resulted in increased production and better welds. Results are tabulated and illustrated. (K1, CN)

270-K. Phenomenon of Strengthening of Welds in the Production of Electrically Welded Tubes. (In Russian.) N. Z. Pertsovskii. *Avtogennoe Delo,* v. 22, June 1951, p. 21-23.

Experimental tubes were prepared from two types of low-carbon strip steel by electric-arc welding. Mechanical properties of the strip and of the finished tubes were determined. Heat treatments for producing uniform properties in the tube were established. Data are charted. (K1, Q general, J general, CN)

271-K. New Type of Electrodes With Improved Technological Properties for Welding Stainless Steel. (In Russian.) A. A. Erokhin. *Avtogennoe Delo,* v. 22, July 1951, p. 4-9.

A new stainless steel welding electrode was investigated under various conditions. Results are tabulated, charted, and illustrated. 14 ref. (K1, SS)

272-K. Automatic Welding of Tubes Without Rotation. (In Russian.) A. S. Fal'Kevich, A. G. Mazel, and Ia. E. Rogachevskii. *Avtogennoe Delo,* v. 22, July 1951, p. 912.

Equipment for automatic butt welding of steel pipelines. Illustrations, tables, and graphs. (K1, CN)

273-K. Contact Welds With the Aid of Stored Kinetic Energy. (In Russian.) S. V. Shablygin. *Avtogennoe Delo,* v. 22, July 1951, p. 12-16.

Equipment and applications. Data are tabulated and illustrated. Includes circuit diagrams and oscillograms. (K1)

274-K. Certain Characteristics of Sources of Heat for Welding Thin Steel Sheets. (In Russian.) A. Ia. Brodskii. *Avtogennoe Delo,* v. 22, July 1951, p. 16-18.

The heating capacity and distribution of heat for Argon-arc, atomic-hydrogen, and oxy-acetylene welding of 18-8 sheet steel were determined. Data are charted. (K1, K2, SS)

275-K. Deformation of Columns of High Buildings During Welding. (In Russian.) D. P. Lebed and I. S. Miroshnichenko. *Avtogennoe Delo,* v. 22, July 1951, p. 22-24.

Because of the difficulty of calculating deformation, it is recommended that, after welding, the warped flanges of beams be cut off so that they will not interfere during assembly. The amount of warpage was found to be proportional to the amount of deposited metal. (K1, T26, CN)

276-K. Testing the Eccentricity of the Coatings of Electrodes. (In Russian.) L. O. Sokolovskii. *Avtogennoe Delo,* v. 22, July 1951, p. 25-26.

Describes and diagrams apparatus. (K1, T5)

277-K. Shielded Arc Welding Process Saves Defective Copper Molds. E. H. Frail. *American Foundryman,* v. 21,

Mar. 1952, p. 44.

The welding of voids found when machining water-cooled Cu molds. The particular arc-welding process employed uses a consumable electrode shielded by argon. No flux is required, resulting in the formation of welds of high purity. Process can be used on practically all commercial metals. (K1, E12, Cu)

278-K. No More Riveting? *Architectural Forum,* v. 96, Mar. 1952, p. 120-121, 160.

Merits of riveting, bolting, and welding in building construction. (K general, T26, CN)

279-K. Welding of Machinery, Pressure Vessels and Piping. R. E. Lorentz, Jr. *Combustion,* v. 23, Mar. 1952, p. 42-45.

Reviews formulation of welding codes. Various welding procedures, and inspection methods. Metallurgical considerations. (K general, ST)

280-K. Dip-Soldering Techniques. *Electronics,* v. 25, Apr. 1952, p. 236, 238, 240.

Procedure used in electron tube fabrication at the Chatham Electronics plant, Newark, N. J. and at the CBS-Columbia plant, Brooklyn, N. Y. (K7)

281-K. Welding Stainless Steels Without Carbide Precipitation. J. A. Goodford and D. W. Kaufmann. *Industry & Welding,* v. 25, Mar. 1952, p. 31-32, 73.

Ways of rapid cooling of heat-affected zone promptly after welding to reduce chances of subsequent intergranular corrosion. (K general, SS, Cr)

282-K. How to Weld Alloy Piping. *Industry & Welding,* v. 25, Mar. 1952, p. 39-40, 74-75.

Recommended procedures for metallic and inert-arc welding and oxy-acetylene welding of pipe, tubes, and wrought welded fittings of Monel, Inconel and nickel. (K1, K2, Ni)

283-K. Huge Fabricated Weldments. Willard W. Wakefield. *Industry & Welding,* v. 25, Mar. 1952, p. 43, 46, 78-79.

Production of beds and platens for special 2500-ton hydraulic presses at Bruce-Macbeth Engine Co., Cleveland. (K1, T5, CN)

284-K. Effects of Moisture in Electrode Coatings. *Industry & Welding,* v. 25, Mar. 1952, p. 48-49, 51, 84-87; Apr. 1952, p. 35-36, 38, 69-70, 72.

Open forum discussion by six outstanding welding authorities. (K1)

285-K. Fundamental Facts About Brazing Fluxes. *Industry & Welding,* v. 25, Mar. 1952, p. 54-56, 59-61, 95.

Types, functions, purpose, properties, performance, and precautions. (K8)

286-K. Fabricated Steel Girders—New Trend? J. B. McCormick. *Industry & Welding,* v. 25, Mar. 1952, p. 63-64, 96-97.

Manufacture of prefabricated all-welded tapered steel girders at Ross-Carter Corp., North Hollywood, Calif. The metal-arc welding torch is rapidly replacing the riveting gun, and sometimes the saw and hammer. (K1, T26, CN)

287-K. How Welding "Keeps 'Em Flying" for the Navy. Howard E. Jackson. *Industry & Welding,* v. 25, Apr. 1952, p. 42-43, 45-46, 73.

Various welding processes, testing and inspection procedure at Overhaul and Repair Dept. of U. S. Naval Station, Seattle, Wash. Materials used include Al, Mg, and various steels. (K general, T24, Al, Mg, ST)

288-K. Mine Maintenance Welding for High Productive Time. James Hyslop. *Industry & Welding,* v. 25, Apr. 1952, p. 54-56, 59, 74-77.

Selection of steels and their properties. (K general, T28, CN, AY)

289-K. Latest Developments in Weld Repairing of Steel Castings. R. A. Willey. *Industry & Welding,* v. 25, Apr. 1952, p. 60-62, 65-68. (K general, CI)

290-K. Ultrasonics Make Soldering Easier. *Iron Age,* v. 169, Mar. 27, 1952, p. 105.

The method is said to be effective with metals such as Al which have chemically inactive oxides and are difficult to solder using ordinary flux methods. (K7)

291-K. Weldments Find Increased Use in Gear Drives. C. J. Schorsch and Robert Hirsch. *Iron and Steel Engineer,* v. 29, Mar. 1952, p. 122, 126, 128.

Experience at United Engineering & Foundry Co., Pittsburgh, Pa., indicates that several cast steel elements can be fused into sturdy and rigid structures by arc welding, instead of using gray iron castings. (K1, CI)

292-K. Measurement of Heat Generated Between the Base Metal and the Electrode in Arc Welding. (In Japanese.) Yutaka Imai and Toshiaki Hagiwara. *Journal of Mechanical Laboratory,* v. 5, Nov. 1951, p. 290-293.

Results of experimental and theoretical investigation for various types of electrodes. Compares American and Japanese types. Apparatus is diagrammed; results are tabulated. (K1)

293-K. The Application of Ultrasonic Soldering Techniques. Alan E. Crawford. *Light Metals,* v. 15, Mar. 1952, p. 102-104.

Apparatus and procedure developed by Mullard, Ltd., in Britain, for ultrasonic soldering of Al and its alloys. Mg and Be cannot be soldered satisfactorily as yet. (K7, Al)

294-K. Welding and Brazing Seamless Nickel Tubing. *Machinery* (London), v. 80, Mar. 6, 1952, p. 426-429.

Methods recommended by International Nickel Co. Tables and graphs. (K general, Ni)

295-K. Fluorocarbon Plastics Bonded to Metals and Rubbers to Provide New Composite Materials. *Materials & Methods,* v. 35, Mar. 1952, p. 96-97.

Properties and applications of Teflon (Du Pont) and Kel-F (M. W. Kellogg Co.). (K11)

296-K. How to Select Brazing and Soldering Materials. H. R. Clauser. *Materials & Methods,* v. 35, Mar. 1952, p. 105-120.

Types, characteristics, and uses of available brazing and soldering materials. The selection problem; brazing alloys and fluxes; soft solders and fluxes; and brazing alloys and solders for various metals. (K7, K8, T5, SG-f)

297-K. Metal Stitching Speeds Aluminum Door Assembly. *Modern Metals,* v. 8, Mar. 1952, p. 36.

By replacing drilling and riveting with metal stitching at Romfohr Overhead Door Co., Portland, Ore. they have increased production rates 30%, cut fastener costs about 75%, and reduced labor costs more than 65%. (K13, Al)

298-K. Adhesives for Metals. K. S. Meakin. *Research,* v. 5, Mar. 1952, p. 126-132.

Development of adhesives, and their application for joining metal under the critical conditions required by modern aeronautical practice. (K12, Al)

299-K. Higher Tensile Short-Link Steel Chain and Chain Slings. W. Gibson Biggart. *Transactions of Institution of Engineers & Shipbuilders in Scotland,* v. 95, Part 3, 1951-52, p. 149-176; disc., p. 176-180.

Problems arising from the manufacture of high-tensile-strength chain by resistance welding and flash-butt welding. Mechanical properties and some suggestions for increasing safe working loads. Assembly of all-steel slings, using atomic-hydrogen welding for joining links. (K3, K1, Q27, CN)

300-K. From Sheet Metal to Home Freezers. Clyde B. Clason. *Welding Engineer,* v. 37, Apr. 1952, p. 23-27.

Welding methods used for production of home freezers and related products. Includes spot welding, oxy-acetylene welding, braze welding, and silver brazing. (K general, CN)

301-K. Welded All the Way. A. G. Barkow. *Welding Engineer,* v. 37, Apr. 1952, p. 28-31.

Construction of the new 1400-mile Texas-to-Chicago 30-in. natural-gas pipeline. Welding problems and techniques. (K1, CN)

302-K. Convair's New Rectifier Welders. R. D. Leonard. *Welding Engineer,* v. 37, Apr. 1952, p. 32-34.

Construction and use of ten new three-phase machines with rectifiers providing d.c. for spot and seam welding of Al and stainless steel at Consolidated Vultee Aircraft Corp., San Diego, Calif. (K3, Al, SS)

303-K. Welded Aluminum Dump Truck Bodies. *Welding Engineer,* v. 37, Apr. 1952, p. 40-41.

Welding operations at Gar Wood Industries, Inc., Richmond, Calif. Inert-are metal-arc welding was used. (K1, Al)

304-K. Aircomatic Welding for Fabricators. *Western Machinery and Steel World,* v. 43, Mar. 1952, p. 84-86, 110.

Applications of process to Al, stainless, Ni, Cu, and other hard-to-weld metals. (K1)

305-K. Sky-Beams; Spot Welds Reduce Weight. *Western Machinery and Steel World,* v. 43, Mar. 1952, p. 91-93.

Structural floor beams of remarkably high strength-weight characteristics are being fabricated with spot welding for use in the cargo-carrying floors of the Boeing C-97 Stratofreighter. Material is clad Al alloy. (K3, Al)

306-K. Joining and Assembly Techniques: Aircraft Bearing Retention and High Strength Fasteners. Thomas A. Piper. *Western Machinery and Steel World,* v. 43, Mar. 1952, p. 94-95.

Method developed at Northrop Aircraft. Roll swaging is used to form bearing retainers. (K13)

307-K. The Welding of Pressure Vessels. H. Harris. *West of Scotland Iron and Steel Institute Journal,* v. 58, 1950-51, p. 11-38; disc., p. 39-48.

Present stage of development in the manufacture of welded pressure vessels. The problems caused by the necessity of using heavy boiler plates. Inspection procedure. (K general, T26, ST)

308-K. Navy-Qualified Welders Produce Intricate Parts. H. J. Boll. *American Machinist,* v. 96, Mar. 31, 1952, p. 94-95.

Pictorial story of welding of special parts of Al, Mg, and carbon and alloy steel; inspection procedures. (K1, S13, Al, Mg, CN, AY)

309-K. Effect of Elongation on Weld Quality. R. G. Alison. *Canadian Metals,* v. 15, Apr. 1, 1952, p. 44-45.

Ability of the weld to elongate depends more on the surface condition of the weld than it does on the type of electrode used. (K1)

310-K. Hermetic Seals. R. O. McIntosh. *Electrical Manufacturing,* v. 49, Apr. 1952, p. 120-123, 328, 330, 332, 334.

Advantages and limitations of various methods for making sealed electrical connections to components that are protected from the atmosphere. Plastic and inorganic materials and the joining of insulator substances to metals. Design data. 12 ref. (K11)

311-K. Local Preheating by Induction in the Arc Welding of Steel Plate. L. N. Belov. *Engineers' Digest,* v. 13, Mar. 1952, p. 79-81. (Translated and condensed from *Avtogenno Delo,* Dec. 1951, p. 9-11.)

Conditions for proper operation including arc condition, flux density, inductor arrangement, and heating time. Simultaneous preheating and welding can be done. Diagrams and table. (K1, CN, AY)

312-K. Back to Work Because of Braze-Welding. *Linde Tips and Oxy-Acetylene Tips,* v. 31, Apr. 1952, p. 42-43.

Some repair jobs that put a useful and important piece of equipment back to work by braze-welding with an oxy-acetylene welding blowpipe. (K8)

313-K. Principles of Braze-Welding. *Linde Tips and Oxy-Acetylene Tips,* v. 31, Apr. 1952, p. 44.

Figures with descriptive captions. (K8)

314-K. How to Join Copper and Aluminum. Walter P. Hill *Refrigerating Engineering,* v. 60, Apr. 1952, p. 347-349, 412.

A series of tests and experiments conducted for a period of six years to develop a practical and foolproof production method for joining Cu and Al. (K general, Al, Cu)

315-K. A Survey of Modern Theory on Welding and Weldability. D. Seferian. *Sheet Metal Industries,* v. 29, Mar. 1952, p. 239-248, 254.

Arc welding electrodes. Functions of the electrode coating, electrical and physical action of the coating, slag analysis, types of slags, and refining of the metal. Micrographs. 18 ref. (To be continued.) (K1)

316-K. Seventy Years of Welding. Howard J. Thompson. *Transactions of the Institute of Welding,* v. 14, Dec. 1951, p. 195-200.

An illustrated review, with emphasis on welded heavy equipment. (K general)

317-K. All-Welded Plate Web Girder. D. H. McPherson. *Transactions of the Institute of Welding,* v. 14, Dec. 1951, p. 210.

Fabrication technique to avoid distortion with an unusually thin web. Diagrams. (K1, T26, ST)

318-K. Reports of International Commissions. *Transactions of the Institute of Welding,* v. 14, Dec. 1951, p. 211-215.

Reports of Commissions on electric arc welding, resistance welding, fatigue of welded structures, weldability, and brittle fractures. Presented at Oxford, England, July, 1951. (K general, Q23)

319-K. Welding Procedures for the Copper-Base Alloys. II. (Concluded.) Lester F. Spencer. *Welding Engineer,* v. 37, Apr. 1952, p. 42-46, 48.

Fusion welding of the various bronzes and of the alloys containing Ni. Resistance welding methods for Cu and all Cu-base alloys. Tables, photographs and 16 ref. (K general, K3, Cu)

320-K. "Contour" Arc Welding. F. J. Pilia. *Welding Engineer,* v. 37, Apr. 1952, p. 54.

New semi-automatic equipment permits welding contoured sheet-metal assemblies by a manual method affording advantages of mechanized welding. (K1)

321-K. Positioners Grow Bigger. *Welding Engineer,* v. 37, Apr. 1952, p. 56.

Positioners for weldments on a 70-ton hopper railroad car and a diesel A-frame. (K1, CN)

322-K. Synthetic Resin Glues: Preliminary Study of Factors Affecting the Strength of Glued Joints in Aluminium Alloys. "Adhesives", His Majesty's Stationery Office (London), 1951, p. 1-18. Based on report by W. J. Roff and K. W. Pepper.) (K12, Al)

323-K. (Book) **Adhesives.** 89 pages. 1950. His Majesty's Stationery Office, London W.C.2, England. (Selected Government Research Reports, v. 7.)

Includes factors affecting strength of glued joints in Al (synthetic resins). Pertinent individual papers are separately abstracted. (K12, Al)

324-K. (Book) **Arc Welding.** Charles H. Zielke. 63 pages. Bruce Publishing Co.,

Milwaukee 1, Wis. 80c.

General information on nature of welding and equipment, and definitions of important welding terms. Striking an arc, depositing string beads and parallel beads, effect of arc length, welding of various types of joints, welding of different metals such as light-gage steel, stainless, aluminum, etc. (K1)

325-K. (Book) **Encyclopaedia of Oxy-Acetylene Welding.** L. J. Tibbenham. 73 pages. Sir Isaac Pitman & Sons, Ltd., London; or British Book Centre, 122 E. 55th St., New York 22, N. Y. $2.50.

Information on all matters connected with oxy-acetylene welding presented in dictionary form. Tables of data required for welding operations. Photographs and drawings. (K2)

326-K. (Book) **Glass.** J. Home Dickson. 300 pages. 1951. Hutchinson's Scientific and Technical Publications, New York.

Includes a chapter on glass-to-metal seals. (K11)

327-K. (Book) **Handbook of Welded Steel Tubing.** 214 pages. 1948. Formed Steel Tube Institute, 1621 Euclid Ave., Cleveland, Ohio.

Factual data on welded steel tubing. General processes of fabrication, mechanical properties, and a variety of material such as mill practice and trade customs. Tabular data give standards of the industry and a compilation of engineering aids. (K general, F26, ST)

328-K. (Book) **Riveting Alcoa Aluminum.** 81 pages. 1951. Aluminum Company of America, Pittsburgh 19, Pa.

Revised edition. Riveting in general, types of heads, rivet alloys, aircraft riveting, etc. (K13, Al)

329-K. Peroxide Tanks Pose Welding Problems. W. F. Shefelton. *American Machinist,* v. 96, Apr. 14, 1952, p. 173.

Picture study of weld fabrication of large tank made of ⅜-in. high-purity Al, for storage of H_2O_2. Inside seams are Heliarc welded; outside seam are preheated with a gas-welding torch to 300° F. prior to welding; and head seams are sigma welded on the outside. Circumferential seams are sigma welded after inside has been Heliarc welded with high-purity rod. (K1, K2, Al)

330-K. Construction of the Willys-Overland Body and Frame. Joseph Geschelin. *Atuomotive Industries,* v. 106, Apr. 15, 1952, p. 46-47, 87.

Welding processes using overhead-mounted portable spot welders, arc welding at certain points in ventilated booths, and use of suitable spot sealers. (K3, K1, T21)

331-K. Huge Spot Welders for Joining Heavy Gage Metals at Ryan and Republic Plants. *Automotive Industries,* v. 106, Apr. 15, 1952, p. 48-49. (K3)

332-K. Reducing Locomotive Maintenance and Repair Costs by Reclaiming Parts with "Heliarc" Welding. C. R. Strutz. *Diesel Power,* v. 30, Apr. 1952, p. 64-66.

Welding assumes greater importance in the railroad field with the introduction of inert-gas-shielded-arc welding. The process and how it is now possible to make better and faster welds with ferrous as well as the more common nonferrous metals. (K1, ST, Al)

333-K. Polyisocyanates in Bonding Rubber to Metals. T. J. Meyrick and J. T. Watts. *India-Rubber Journal,* v. 122, Mar. 29, 1952, p. 505-506.

A method for the use of a polyisocyanate together with a neoprene alloprene cement. Tabular data. (K11)

334-K. Unusual Soldering and Brazing Operations Performed in Heat Treating Furnaces. *Industrial Heating,* v. 19, Apr. 1952, p. 624, 626, 628.

As performed by Glass Solder Engineering Co., South Pasadena, Calif. (K7, K8)

335-K. Stud Welding Cuts Fabrication Time. *Iron Age,* v. 169, Apr. 24, 1952, p. 146-147.

Portable guns are used for end-welded studs in the fabrication of railroad cars; also attaching furring strips, insulation, wood liners, and ladders. (K1, CN)

336-K. Brazing the Modern Way. Lester F. Spencer. *Machinery* (American), v. 58, Apr. 1952, p. 167-169.

Recommended procedures and equipment. Compositions of commercial brazing alloys are tabulated. The alloys and fluxes for various metals. (K8, T5, SG-f)

337-K. Unique Welding Fixture Results in Large Savings. *Machinery* (American), v. 58, Apr. 1952, p. 178-179.

For arc welding of steel conveyor flights. (K1, CN)

338-K. Recommended Conditions for Spot-Welding Annealed Inconel Sheet. *Machinery* (American), v. 58, Apr. 1952, p. 243.

A data sheet. (K3, Ni)

339-K. Materials and Procedures for Soldering Aluminum. G. W. Birdsall. *Materials & Methods,* v. 35, Apr. 1952, p. 116-118.

Successful soldering of relatively

small assemblies is now commercially feasible provided proper solders, fluxes, and techniques are used. (K7, Al)

340-K. Automatic Welding With Contact Electrodes. W. P. van den Blink, H. Bienfait, and J. A. van Bergen. *Philips Technical Review,* v. 13, Mar. 1952, p. 247-253.

Mechanization of welding has now become possible through the development of certain types of electrodes together with an automatic welder. (K1)

341-K. Design Data For Metal Wire Stitching. *Product Engineering,* v. 23, Apr. 1952, p. 156-157.

Data sheet includes tables and diagrams for various metals and nonmetals. (K13)

342-K. Counters Tunnel Problem With Long Rails, Rubber Pads. *Railway Engineering and Maintenance,* v. 48, Apr. 1952, p. 394-395.

New butt-welded rails with rubber-pads placed above and below the tieplates were tied in two tunnels in an effort to lick the problem of corrosion and excessive mechanical wear of ties. (K1, R general, Q9, CN)

343-K. Spot Welding of Light Alloys Made Easier by New Equipment. *Sheet Metal Industries,* v. 29, Apr. 1952, p. 358.

"Modu-Wave" spot welding machine for Al and light alloys. (K3, Al)

344-K. Shielded, Submerged Arc Welds Withstand Rugged Service. F. R. Drahos. *Steel,* v. 130, Apr. 14, 1952, p. 94-96.

Some examples of applying weldments to high-tensile, heat resistant, and corrosion resistant alloys, whether in a cast, forged, or wrought condition. Concerns massive components for large centrifugal pumps. (K1, L24, SG-g, h)

345-K. Outstanding Welding Repairs on Hot Blooming Mill Shears. E. E. N. Bernhard and P. A. Dixon. *Welder,* v. 21, new ser., Jan.-Mar. 1952, p. 2-7.

Repair of a large steel casting by welding. Technique used is claimed to be entirely new. Severe load conditions met. Each stage of repair is illustrated with photographs and drawings. (K general, T5, CI)

346-K. A Welded Pipe Valve in Nigeria. G. Fairservice. *Welder,* v. 21, new ser., Jan.-Mar. 1952, p. 8-9.

An emergency valve was quickly designed and fabricated with the aid of welding from ¼-in. mild steel plate, stiffened on the inside with ¼-in. plate brackets. Construction and fitting of the valve. (K1, T4, CN)

347-K. Welding in the Fire Engineering Industry. *Welder,* v. 21, new ser., Jan.-Mar. 1952, p. 10-12.

Welding and fabrication of turntable ladders of all-steel construction, made in four or five sections. (K general, T10, ST)

348-K. A Special All-Welded 120-Ton Trailer. *Welder,* v. 21, new ser., Jan.-Mar. 1952, p. 13-15.

The trailer is of all-welded design, and it is an example of the strength of this form of fabrication. (K general, T21, ST)

349-K. An All-Welded Goliath-Type Crane. *Welder,* v. 21, new ser., Jan.-Mar. 1952, p. 15.

Fabricated with Murex "Fastex 5" electrodes. (K1, ST)

350-K. Welded Motor Lighters. *Welder,* v. 21, new ser., Jan.-Mar. 1952, p. 17-20.

(K general, T22, ST)

351-K. A Welded Stainless Steel Tanker. *Welder,* v. 21, new ser., Jan.-Mar. 1952, p. 20-21.

Tank was built by Andrews Bros. Ltd., specialists in the fabrication of stainless steel. (K general, T22, SS)

352-K. Fabricating Modern Pressure Vessels. *Welding and Metal Fabrication,* v. 20, Apr. 1952, p. 120-129.

The plant and layout of G. A. Harvey & Co., London. Recent developments in the manufacture and design of pressure vessels. (K general, T26, CN)

353-K. Failures in Welded Ships. *Welding and Metal Fabrication,* v. 20, Apr. 1952, p. 130-134.

(K9, CN)

354-K. Quality Control of Spot Welded Assemblies. A. J. Hipperson. *Welding and Metal Fabrication,* v. 20, Mar. 1952, p. 99-102; Apr. 1952, p. 143-145.

Methods employed for maintaining consistent spot welds. Tabular data on welding carbon and stainless sheet. (K3, CN, SS)

355-K. Practical Aspects of Welding and Metalworking. *Welding and Metal Fabrication,* v. 20, Apr. 1952, p. 151-152.

Fixing methods for small piercing punches; pipe butt welds and repair of hydro-extractors. (K general)

356-K. Weldable Low-Alloy Steels for Pressure Vessels. (Translated and Condensed from "Schweissbare niedriglegierte Stähle mit hoher Warmstreckgrenze für Hochdruck-Kesseltrommeln," *Stahl und Eisen,* v. 71, 1951, p. 1443-1444.) Franz Nehl. *Weld-*

ing Journal, v. 31, Apr. 1952, p. 231s-232s.
(K general, T26, AY)

357-K. Heat Treating Properties of Low Hydrogen Electrode Weld Metals. D. C. Smith and W. G. Rinehart. *Welding Journal,* v. 31, Apr. 1952, p. 296-305.
Necessity for matching the mechanical properties of roller or cast steel with the weld metal which requires an adjustment of the alloy composition of the electrode and the type of electrode coating. Graphs, tabulations, diagrams. (K1, T5, AY)

358-K. Preheating for Welding. Arthur B. Tesmen. *Welding Journal,* v. 31, Apr. 1952, p. 306-313.
A review of information and experience to produce crack-free welded joints under a wide variety of conditions. Includes table of preheat temperatures for metals and alloys. 14 ref. (K general)

359-K. Should Welding Be on Its Own in Education? Discussion. Donald S. Clark. *Welding Journal,* v. 31, Apr. 1952, p. 313-314.
Discussion of paper published in July 1951 issue. (K general, A3)

360-K. Recommended Practice for the Welding of Steel Castings. (A Condensation.) *Welding Journal,* v. 31, Apr. 1952, p. 315-321.
Excerpt from a study carried out as part of the continuing research and development program of Steel Founders' Society of America. Includes specifications; effects of welding and combating these; operations, and post-weld heat treatment. (K general, CI)

361-K. Resistance Variations During Spot Welding. Discussion. H. Udin. *Welding Journal,* v. 31, Apr. 1952, p. 322-323.
Discussion of paper by W. L. Roberts in Nov. 1951 issue (item 19-K, 1952). (K3)

362-K. Kilowatts Don't Weigh Anything. W. P. Brotherton. *Welding Journal,* v. 31, Apr. 1952, p. 334-336.
Only recently has spot welding attained top billing in the aircraft industry. Modern equipment is now engineered to fabricate primary, load-carrying aircraft structures and heavy-gage metals of practically every kind. At Ryan they are securing spot welded joints in stainless steels that are 100% efficient compared with an average of 60% efficiency for riveted joints.
(K3, SS)

363-K. Refinery Welding. C. G. Herbruck. *Welding Journal,* v. 31, Apr. 1952, p. 337-339.
Work at C. F. Braun & Co. plants.
(K general, T29)

364-K. Welding Sequence Prevents Distortion. F. C. Geibig. *Welding Journal,* v. 31, Apr. 1952, p. 339.
How three spokes of a cast-iron sheave, which cracked under heavy loading, were repaired by braze welding. A definite welding sequence was followed to avoid distortion.
(K8, CI)

365-K. A. C. Argonarc Process for Welding Aluminium: an Oscillographic Analysis of Effects of Welding Transformer Open-Circuit Voltage or Arc Re-Ignition. L. H. Orton and J. C. Needham. *Welding Research,* v. 5, Dec. 1951, p. 252r-274r.
Tests were made on two work plate materials over a range of open-circuit voltage, at approximately constant current, both with and without high-frequency spark injection, on a circuit deriving power from a leaky-reactance type welding transformer, and both with and without a large series capacitor in the welding circuit. Establishes for these tests the open-circuit voltages for the avoidance of rectification. Explains wide discrepancies in previous literature. Fundamental question of the nature of the arc re-ignition. (K1, A1)

366-K. Spot Welding of Coated Mild Steel Sheet. A. J. Hipperson and P. M. Teanby. *Welding Research,* v. 5, Dec. 1951, p. 275r-278r.
Operational data to solve certain production difficulties in spot welding of electrodeposited Cd and Zn coatings. Electrode sticking and sensitivity of weld to small changes of machine settings.
(K3, L17, CN, Cd, Zn)

367-K. Welding in Hydro-Mechanical Structures. (In French.) J. J. Woolf. *Soudure et Techniques Connexes,* v. 6, Jan.-Feb. 1952, p. 5-13; disc. 13-15.
Welding of equipment in heating plants, particularly water pipes, and reconditioning work such as electric-arc and oxy-acetylene torch reconditioning. (K general, CN)

368-K. Electric Arc Welding of Magnesium Alloys. (In Russian.) K. K. Khrenov, M. I. Garchenko, and G. P. Sakhatskii. *Avtogennoe Delo,* v. 22, Aug. 1951, p. 1-5.
An investigation was made of carbon-arc welding of Mg alloy. Fluxes, weld design, and other variables were studied. Results tabulated. Micro and macrophotographs. 12 ref.
(K1, Mg)

369-K. Welding of Rod Frameworks for Reinforced Concrete by the Method of N. G. Slavianova. (In Russian.) S. T. Nazarov and I. S. Dmitriev. *Avtogennoe Delo,* v. 22, Aug. 1951, p. 6-9.

Variables were studied. Results are tabulated. Schematic diagrams. (K1, CN)

370-K. Instrument for Dilatometric Control of the Spot Welding Process. (In Russian.) D. S. Balkovets and A. P. Pomortsev. *Avtogennoe Delo,* v. 22, Aug. 1951, p. 10-13.

Apparatus is described and diagrammed. Its use and typical tabulated data. (K3)

371-K. Calculation of Resistance During Spot Welding of Low-Carbon Steel. (In Russian.) L. V. Glebov. *Avtogennoe Delo,* v. 22, Aug. 1951, p. 13-14.

Equations are developed and several variables discussed. Data are tabulated and charted. (K3, CN)

372-K. Electrical-Contact Resistance During Fusion Butt Welding. (In Russian.) P. S. Elistratov. *Avtogennoe Delo,* v. 22, Aug. 1951, p. 14-16.

Experimental values are broken into component parts. Current density, rate of fusion, and type of welding machine (two types) were the principal variables. Data are tabulated and charted for low-carbon steel. (K1, CN)

373-K. Mechanism of Striking Electric Welding Arcs. (In Russian.) M. Ia. Broun and G. I. Pogodin-Alekseev. *Avtogennoe Delo,* v. 22, Aug. 1951, p. 16-17.

A theoretical discussion. Several variables are included. (K1)

374-K. New Automatic Apparatus for Arc Welding Thin Sheets of Steel. (In Russian.) B. I. Kalinkin. *Avtogennoe Delo,* v. 22, Aug. 1951, p. 17-20.

A new machine is described and schematically illustrated. Applications. (K1, ST)

375-K. The Pre-Eminence of Soviet Science and Technology in Welding Under Flux. (In Russian.) *Avtogennoe Delo,* v. 22, Sept. 1951, p. 1-3.

Various examples of developments said to have been made in Russia ahead of America and other capitalistic countries. (K1)

376-K. Nitrogen-Arc Welding of Copper. (In Russian.) A. N. Shashkov and Ts. S. Khromova. *Avtogennoe Delo,* v. 22, Sept. 1951, p. 4-7.

The use of nitrogen instead of argon as a protective medium. Results of the two methods are compared in photographs. Data are tabulated and charted. (K1, Cu)

377-K. Investigation of Parameters of the Gas Pressure Welding of Tubes. (In Russian.) A. S. Fal'kevich and R. B. Poliakova. *Avtogennoe Delo,* v. 22, Sept. 1951, p. 7-11.

Butt welding of low-carbon steel tubing by the gas-pressure method. Use of automatic equipment. Data are tabulated and charted. (K2, CN)

378-K. The Problem of the Transfer of Phosphorus From the Flux Into the Weld Metal During Automatic Weldings. (In Russian.) M. R. Shraerman. *Avtogennoe Delo,* v. 22, Sept. 1951, p. 11-14.

Investigated in the laboratory. The influence of P and Mn content on mechanical properties of welds in 1.40% Mn steel was determined. Data are tabulated and charted. (K1, Q general)

379-K. Conditions for Exceeding the Output Characteristic of a Welding Transformer Through a Given Point. (In Russian.) G. I. Leskov. *Avtogennoe Delo,* v. 22, Sept. 1951, p. 14-15.

A mathematical discussion. Results are charted. (K1)

380-K. Welding High Pressure Tubes. (In Russian.) I. Z. Kagan. *Avtogennoe Delo,* v. 22, Sept. 1951, p. 24-25.

Preparation and welding of thick-walled, carbon steel tubing. Diagrams. (K general, CN)

381-K. Definition of the Concept of the "Weldability of Metals". (In Russian.) A. A. Alov. *Avtogennoe Delo,* v. 22, Sept. 1951, p. 26-29.

Various aspects are illustrated by photomicrographs of welds in steel. 10 ref. (K9)

382-K. Definition of the Concept of "Weldability". (In Russian.) *Avtogennoe Delo,* v. 22, Sept. 1951, p. 29-30. (K9)

383-K. The Problem of Definition of the Nature of the Concept of "Weldability of Metals". (In Russian.) A. I. Krasovskii. *Avtogennoe Delo,* v. 22, Sept. 1951, p. 30-31.

Conclusions reached by a committee on "The Weldability of Metals" organized by "VNITOS". (K9)

384-K. Good Aluminum Welding Starts With the Engineer. R. M. Curran. *General Electric Review,* v. 55, May 1952, p. 13-15.

Discussion and tables of properties to aid in selection of Al alloys and proper welding process. (K general, Al)

385-K. Special Spot Welding Machines Solve Huge Aluminum Alloy Fuel Tank Production Problems. *Light Metal Age,* v. 10, Apr. 1952, p. 26-27.

Equipment and procedure at Ryan Aeronautical Co., San Diego. (K3, Al)

386-K. New Tugs For Old. *Marine Engineering and Shipping Review,* v. 57, May 1952, p. 72-74.

Electric arc welded prefabrication of hull and superstructure parts speeds modernization of tugboat fleet. (K1, CN)

387-K. Properties of Some Heat-Resistant Adhesives. C. W. Roush and A. J. Kearfott. *Mechanical Engineering,* v. 74, May 1952, p. 369-374.

Information collected while developing and improving an adhesive for brake-shoe application, which is one of the most severe in the automotive industry. The requirements imposed indicate the range of properties that can be expected. (K12)

388-K. Resistance Welding. A. J. Hipperson and E. J. Keefe. *Metal Industry,* v. 80, Apr. 11, 1952, p. 283-286; Apr. 18, 1952, p. 306-307.

Modern practice in joining Cu-base alloys. Comparative physical properties of steel and Cu alloys (factors affecting resistance welding) are tabulated.
(K3, P general, Cu, ST)

389-K. Furnace Brazing: Atmospheres Set the Pace. Samuel Damon. *Steel,* v. 130, May 5, 1952, p. 102-104, 127-128.

Atmospheres and requirements for specific metals. (K8)

390-K. Tricky Welding for Pipe System. Fred M. Burt. *Welding Engineer,* v. 37, May 1952, p. 37-39.

Fabrication of stainless steel process-water piping. The various cut-to-size components were rolled to the proper radius on one of four heavy-duty bending rolls and then joined by automatic and manual inert-arc welding. (K1, SS)

391-K. Willys-Overland Welds New Family Car. W. C. Henzlik. *Welding Engineer,* v. 37, May 1952, p. 44-46, 48.

Expansion spot welding, indirect gun welding, arc welding, and inspection procedures. (K1, K3, ST)

392-K. Kilowatts Save Weight. Electric Welds Eliminate Weight and Make Fairing Surfaces Clean. William P. Brotherton. *Western Machinery and Steel World,* v. 43, Apr. 1952, p. 104-106.

See abstract of "Kilowatts Don't Weigh Anything", *Welding Journal;* item 362-K, 1952. (K3, SS)

393-K. Arc Welding of Metallic Joints in Light Alloys. (In French.) A. Klopfert. *Revue de l'Aluminium,* v. 29, Feb. 1952, p. 51-56.

Applications of automatic flash welding to Al-alloy tubular and structural sections. Application in building construction. (K1, T26, Al)

394-K. Soldering of Aluminium. (In German.) L. Rostosky. *Aluminium,* v. 28, Jan.-Feb. 1952, p. 10-14.

Historical survey. Choice of soldering alloy; procedures; examples of application. (K7, Al, SG-f)

395-K. Araldit Bonding of Light Metals. (In German.) *Aluminium,* v. 28, Jan.-Feb. 1952, p. 14-19.

Form of bonding agents, chemical and physical properties, hardening data, behavior of bonds between Al-Mg-Si and other alloys. Effect of amount of overlap on strength. Practical applications. Tables, graphs, and diagrams. (K12, Al)

396-K. Welding of Light-Metal Cables by Means of an Aluminothermic Method. (In German.) R. Frey. *Aluminium,* v. 28, Jan.-Feb. 1952, p. 28-31.

Apparatus and procedure.
(K4, Al)

397-K. Synthetic-Resin Adhesives for High-Strength Bonding of Metals. (In German.) E. W. Pleines. *Aluminium,* v. 27, Oct. 1952, p. 40-44.

Particularly British experiences with Araldit and Redux types. Diagrams. (To be continued.) (K12)

398-K. Roll Welds for Joining Boiler Tubes to High-Pressure Vessels. (In German.) H. Elsässer. *Brennstoff-Wärme-Kraft,* v. 4, Mar. 1952, p. 80-83.

Procedure, weld design, mechanical properties of welds, and test methods. Diagrams, tables, and photographs of joints.
(K5, Q general, ST)

399-K. Influence of Chemical Composition of Certain Binary Aluminum Alloys on Their Tendency Toward Formation of Cracks During Gas Welding. (In Russian.) S. V. Avakian and N. F. Lashko. *Avtogennoe Delo,* v. 22, Oct. 1951, p. 1-6.

A study was made for Al-Sn, Al-Si, Al-Cu, Al-Mg, and Al-Zn alloys. Data are tabulated, charted, and illustrated. (K9, Al)

400-K. Comparison of the Properties of Welds in 18-8 Steel Joined by Argon Arc and Other Methods of Fusion Welding. (In Russian.) A. Ia. Brodskii. *Avtogennoe Delo,* v. 22, Oct. 1951, p. 6-10.

Microstructures and other properties of welds obtained by various methods. The argon arc gave the best welds; oxy-acetylene the poorest. Data are tabulated and charted. (K1, K2, SS)

401-K. Determination of Initial Values During Calculations of Regulators for Three-Phase Arc Welding. (In Russian.) D. A. Armatsev. *Avtogennoe Delo,* v. 22, Oct. 1951, p. 11-13.

Mathematical analysis. (K1)

402-K. Choice of Method of Welding and Apparatus for Preparation of Frameworks for Reinforced Concrete Buildings. (In Russian.) I. S. Dmitriev. *Avtogennoe Delo,* v. 22, Oct.

1951, p. 17-20.

Discussed and classified in tabular form. (K general, T26, CN)

403-K. Contact Butt Welding of Tubes With Resulting Upsetting. (In Russian.) G. V. Nedzvetskii. *Avtogennoe Delo*, v. 22, Oct. 1951, p. 21-22.

Quality and strength of upset butt welded steel tubes. (K1, CN)

404-K. Weld Fabrication of Nickel Apparatus. (In Russian.) I. Z. Kagan. *Avtogennoe Delo*, v. 22, Oct. 1951, p. 24-25.

Oxy-acetylene and argon-arc welding of Ni sheet. Data are tabulated. (K1, K2, Ni)

405-K. Construction Technique for Large Aluminum Storage Tanks. (In Italian.) *Alluminio*, v. 21, Jan. 1952, p. 65-88.

Selection of material, calculation of thickness, construction and installation patterns, and inspection. Tabular data, photographs, and schematic diagrams. 42 ref. (K general, T26, Al)

406-K. Recent Researches on the Arc Welding of Thick Aluminium Alloy Plate. P. T. Houldcroft, W. G. Hull, and H. G. Taylor. *Aluminium Development Association* (London), "Proceedings at a Symposium on Welding and Riveting Larger Aluminium Structures", Feb. 1952, p. 12-43; disc., p. 78-130.

Previously abstracted from condensed version in *Welding and Metal Fabrication;* item 148-K, 1952. (K1, Al)

407-K. Practical Aspects of the Argon-Arc Welding of Aluminium Alloys. J. R. Handforth. *Aluminium Development Association* (London), "Proceedings at a Symposium on Welding and Riveting Larger Aluminium Structure", Feb. 1952, p. 44-77; disc., p. 78-130.

Previously abstracted from condensed version in *Welding and Metal Fabrication;* item 143-K, 1952. (K1, Al)

408-K. The Properties and Driving of Large Aluminium Alloy Rivets. J. C. Bailey. *Aluminium Development Association* (London), "Proceedings at a Symposium on Welding and Riveting Larger Aluminium Structures", Feb. 1952, p. 133-154; disc., p. 176-216.

Progress since 1946—development of Al alloy rivets larger than ⅜ in. diameter. Investigations on manufacture and characteristics of such rivets and techniques of driving them with standard equipment, both hydraulic and pneumatic. Mechanical properties of rivet alloys in the form of extruded bar stock are tabulated, as well as pressures required to form various shapes of driven points by squeeze riveting. Shear-strength values for hammer and squeeze-driven rivets are also given. (K13, Al)

409-K. The Design Characteristics of Aluminium Riveted Joints. S. C. Redshaw. *Aluminium Development Association* (London), "Proceedings at a Symposium on Welding and Riveting Larger Aluminium Structures", Feb. 1952, p. 155-175; disc., p. 176-216.

From results of extensive program tests on double shear joints, effects of variations in joint materials and proportions are considered. Graphs and illustrations. (K13, Al)

410-K. Latest Developments in Weld Repairing of Steel Castings. (Concluded.) R. A. Willey. *Industry & Welding,* v. 25, May 1952, p. 37-38, 40, 72-75.

Defects were cast in the test plate and then welded with the electrode under survey. Transverse mechanical properties of the weld metal were obtained by machining 0.505-in. tensile bars from 1-in. sections cut at right angles to the direction of the weld-metal passes. (K1, Q general, CI)

411-K. Improved Brazing Techniques For Increased Production. *Industry & Welding,* v. 25, May 1952, p. 52, 54-55, 96-97. (K8)

412-K. Elements of Resistance Welding. A. E. Rylander. *Industry & Welding,* v. 25, May 1952, p. 62-63, 65-66, 68-72.

A review. Diagrams. (To be continued.) (K3)

413-K. Get Better Welds With Iron Powder Backup. *Iron Age,* v. 169, May 8, 1952, p. 116-118.

Iron powder has been successfully used as backup material for welds on SAE 1015 and 1025 steels. Hardening, resulting from rapid heat dissipation, is counteracted, and the need for chiseling out and rewelding the root of the seam is eliminated. Powder is pressed into narrow sheet metal channels and slightly sintered. Unsintered powder bars, in as-pressed form, can be bent somewhat and are suitable for pipeline welding. (K general, H general, CN)

414-K. Metal Stitching Can Help To Reduce Costs of Fastening. *Machine Design,* v. 24, May 1952, p. 151-153.

Includes equipment diagrams and illustrations; table of recommended thicknesses for various metal-metal and metal-nonmetal combinations. (K13)

415-K. Automatic Welding Design for Economical Production of Moder-

ate Quantities. John Mikulak. *Machine Design,* v. 24, May 1952, p. 170-172, 224, 227-228.

See abstract of "Product Design for Welding", *Welding Journal;* item 134-K, 1952. (K1)

416-K. Welded Construction Simplifies Drilling and Reaming Fixture. E. W. Obringer. *Machinery* (American), v. 58, May 1952, p. 152-153.

Drilling and reaming fixture of welded construction for a large irregular-shaped part. (K1, T6, ST)

417-K. Brazing the Modern Way. (Continued.) Lester F. Spencer. *Machinery* (American), v. 58, May 1952, p. 161-165.

Methods of brazing various materials. Diagrams and illustrations. (K8, ST, Cu, Ni, CN, SS)

418-K. Control of Weld Cracking. *Metal Progress,* v. 61, May 1952, p. 116, 118, 120, 122. (Condensed from "Control of Cracking in Arc Welding High-Tensile Structural Steels." C. L. M. Cottrell, M. D. Jackson, and J. G. Whitman.)

Previously abstracted from *Welding Research.* See item 673-K, 1951. (K3, K9, AY)

419-K. Embrittlement of Welds. *Metal Progress,* v. 61, May 1952, p. 168, 170, 172. (Condensed from "Microcracks and the Low-Temperature Cooling Rate Embrittlement of Welds." A. E. Flanigan and M. Kaufman.)

Previously abstracted from *Welding Journal.* See item 107-K, 1952. (K9, Q23, CN)

420-K. Pipe Welding in the Oil Industry; a Description of Current Techniques in the Welding of Oilwell and Refinery Piping. Rolt Hammond. *Petroleum,* v. 15, May 1952, p. 124-126. (K general, ST)

421-K. Methods of Assembly in Fabricated Work. J. Floyd. *Sheet Metal Industries,* v. 29, May 1952, p. 405-407, 411.

Electric arc welding. Forming and erecting of all-welded, mild-steel tank. (K1, CN)

422-K. A Survey of Modern Theory on Welding and Weldability. (Continued.) D. Seferian. *Sheet Metal Industries,* v. 29, May 1952, p. 441-446.

Refining effect of the electrode coating, refining by reducing agents, slag-metal equilibrium, and the Mn equilibrium. Numerous graphs and tabular data. (To be continued.) (K9, K1)

423-K. Discussion on Higher Tensile Steel Chain and Chain Slings. W. Gibson Biggart. *Transactions of the Institution of Engineers & Shipbuilders in Scotland,* v. 95, pt. 4, 1951-52, p. 181-194.

Additional discussion of paper published in v. 95, pt. 3, 1951-52; item 299-K, 1952. (K3, K1, Q27, CN)

424-K. Industrial Brazing; Design and Strength of Brazed Joints. E. V. Beatson and H. R. Brooker. *Welding and Metal Fabrication,* v. 20, Apr. 1952, p. 146-149; May 1952, p. 182-188.

Correlates and analyzes data for various brazing alloys and metals joined. Recommended joint designs. Tables, graphs, and diagrams. (K8, SG-f)

425-K. The Twin-Arc Process. W. D. Waller. *Welding and Metal Fabrication,* v. 20, May 1952, p. 162-168.

Process and equipment. Advantages, characteristics, applications, and cost data. New electrodes designed for mild steel. Photographs, tables, and graphs. (K1, CN)

426-K. Extensions at the Llandarcy Refinery. *Welding & Metal Fabrication,* v. 20, May 1952, p. 169-173.

A training and testing plan and various welded fabrications, including a stainless steel lining, in connection with construction program at refinery in South Wales. (K9, SS)

427-K. Welding Methods for Schwinn Bicycles. Clyde B. Clason. *Welding Engineer,* v. 37, May 1952, p. 34-36.

Work at Arnold, Schwinn & Co., Chicago. Joints flash welded are: seat post to crank hanger; bottom bar to crank hanger; top and bottom bars to head. Top bar is braze welded to the seat post. Center bar is silver brazed to seat post and to the bottom bar. (K3, K8, CN)

428-K. Jiffy Joining Chart. *Welding Engineer,* v. 37, May 1952, p. 51.

Gas-welding processes you may select in order to join a given material to a similar or dissimilar metal. Includes fusion welding, braze-welding, and brazing. (K2, K8)

429-K. Values of Permissible Stresses in Welded Joints in Metallic Construction. (In Russian.) G. A. Nikolaev. *Avtogennoe Delo,* v. 22, Nov. 1951, p. 3-4.

Specifications and design data for welds in structural steels, also for electrodes used. (K general, T26, CN)

430-K. Development of Formulas for Welded Construction for Metals Having Various Plastic Properties. (In Russian.) G. P. Mikhailov and L. A. Kaplan. *Avtogennoe Delo,* v. 22, Nov. 1951, p. 6.

Derivation of the formulas. Includes graphical interpretation. (K general)

431-K. Automatic Three-Phase Arc Welding of Thick "15M" Steel. (In Russian.) K. V. Liubovskii, B. I. Lazarev, and M. M. Timofeev. *Avtogennoe Delo,* v. 22, Nov. 1951, p. 7-10.

Experiments on three-phase arc welding and on development of special fluxes are claimed to be the basis for wide introduction of this method into industry, especially for the production of thick-walled vessels and similar construction. Macrographs, tables, and diagrams. (K1, CN)

432-K. Nature and Role of the Melting Process During Flash Welding. (In Russian.) A. S. Gel'man, K. P. Imshennik, and N. S. Kabanov. *Avtogennoe Delo,* v. 22, Nov. 1951, p. 11-15.

High-speed motion pictures and oscillographs were used to study the flash welding of steel. (K3, ST)

433-K. Certain Characteristics of Flux-Submerged Welding Arcs. (In Russian.) N. G. Ostapenko. *Avtogennoe Delo,* v. 22, Nov. 1951, p. 15-21.

An oscillographic study was made. Data are tabulated and illustrated. 11 ref. (K1)

434-K. Automatic Welding of Chemical Apparatus. (In Russian.) I. Z. Kagan. *Avtogennoe Delo,* v. 22, Nov. 1951, p. 24-26.

Welding practices. (K1, CN)

435-K. Repairing Thin-Walled Iron Castings Using Bimetallic Electrodes. (In Russian.) N. A. Rybchinskii. *Avtogennoe Delo,* v. 22, Nov. 1951, p. 28-29.

Repair of cracks in soil pipe and similar articles. Micrographs and illustrations. (K1, CI)

436-K. (Book) **Proceedings at a Symposium on Welding and Riveting Larger Aluminium Structures. 1952.** 223 pages. Aluminium Development Association, 33 Grosvenor St., London, W.1, England.

Foreword and remarks are followed by two sessions, one on welding and one on riveting—each consisting of two papers, joint discussion and authors' replies. Concludes with a summary of the discussions and a list of those present. Separate papers are individually abstracted. (K general, Al)

437-K. (Book) **Structural Adhesives; the Theory and Practice of Gluing With Synthetic Resins.** 203 pages. 1951. Lange, Maxwell & Springer, Ltd., 41-45 Neal St., London W.C.2, England.

A series of lectures presented at a summer-school course given in Cambridge, England, by Aero Research, Ltd. (K12)

438-K. (Book) **The Welding of Nonferrous Metals.** E. G. West. 553 pages. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $8.50.

Weldability, properties important in welding, the fusion welding process, resistance welding, pressure welding. Separate chapters discuss welding of specific groups of metals and alloys. (K general, Al, Cu, Pb, Zn)

439-K. How to Weld Titanium. A. J. Rosenberg and E. F. Hutcninson. *American Machinist,* v. 96, May 26, 1952, p. 93-97.

Results of extensive tests made at G.E.'s Thomson Laboratory on three welding methods (inert-arc, spot and flash) for three grades of Ti. Tables, micrographs, and macrographs. Mechanical properties of welds. (K1, K3, Q general, Ti)

440-K. Welding Study: Titanium and Titanium-Alloy Sheet. *American Machinist,* v. 96, May 26, 1952, p. 98-99.

Results include fatigue-strength data obtained by Chance-Vought Aircraft Div., United Aircraft Corp. (K general, Q7, Ti)

441-K. Test Methods For Weldments. *American Machinist,* v. 96, May 26, 1952, p. 127, 129, 131.

Methods used in automotive industry. Deep-etch tests, guided-bend tests, shear tests for fillet welds, nick-break tests for butt welds, and size and contour measurement of fillet welds. Diagrams. (K9)

442-K. Welding Stars in Aircraft Production. Frederick S. Dever. *American Machinist,* v. 96, May 12, 1952, p. 170-171.

Five special effects in new, electronically controlled Thompson and Federal welders at Ryan Aeronautical Co. Gasoline tanks, Inconel jet-engine combustion chambers, and exhaust systems are welded. (K3, Ni, SG-h, Al, ST)

443-K. New Machines at Buick Plant Weld Brackets to Axle Housings. S. M. Spice. *Automotive Industries,* v. 106, May 15, 1952, p. 34-36.

Special arc-welding equipment and procedure. (K1, CN)

444-K. Equipment and Design. Charles Owen Brown. *Industrial and Engineering Chemistry,* v. 44, May 1952, p. 91A-92A, 94A.

New developments in welding of light metals. Apologizes for inaccuracies in Nov. 1951 article. (K general, Al, Mg)

445-K. Welding Heat Exchangers for the Chemical Industry. John W. Mortimer. *Welding Journal,* v. 31, May 1952, p. 387-392.

Different types of heat exchangers and fabrication procedures for their manufacture. Emphasis on welding, but includes choice of alloys for different parts and service conditions, inspection, testing, and finishing. (K general, T29)

446-K. Metal Transfer in Sigma Welding. R. T. Breymeier. *Welding Journal,* v. 31, May 1952, p. 393-399.

Effect of different welding conditions, current, gas mixtures, and rod material was studied by ultra-slow-motion photography. Experimental results with carbon and stainless steel and with aluminum. Effects of current direction and amperage, and gas, on surface appearance of beads. Their effects on rate of consumption of electrode wire and on voltage recorded are charted. Compares results with pure argon and with Linde's sigma grade (oxygen plus argon.)
(K1, SS, CN, Al)

447-K. Effects of Nose Design on Spot Welding Electrodes. E. F. Holt and L. W. Sink. *Welding Journal,* v. 31, May 1952, p. 400-406.

Performance of nine standard designs of spot welding electrodes in terms of weld quality and electrode life. Each design was tested under two sets of closely controlled conditions by making 10,000 spot welds on two thicknesses of half-hard, cold rolled, mild steel. Appearance of welds and of test electrodes. Graphs and tables. (K3, CN)

448-K. Welding Characteristics of Materials for Aircraft Gas Turbines. A. J. Rosenberg. *Welding Journal,* v. 31, May 1952, p. 407-413.

Results of a welding program on high-temperature sheet materials. Those evaluated include austenitic stainless steels, age hardenable high-Ni alloys (Inconels), Haynes Stellite alloys, low-alloy high-tensile steels, and Ti and its alloys. Micrographs and macrographs.
(K general, AY, SS, Ni, Co, SG-h)

449-K. Dilution and Diffusion Aspects of Nonfusion Welding. *Welding Journal,* v. 31, May 1952, p. 413-414.

Discussion by H. Udin of above paper by R. D. Wasserman and J. Quaas (Dec. 1951 issue; item 102-K, 1952). Includes authors' reply. (K8)

450-K. Hints on Radiant Heating. R. G. Harner. *Welding Journal,* v. 31, May 1952, p. 417-418.

Gas welding of small-diameter steel or wrought-iron pipe for radiant-heating systems. (K2, ST, Fe)

451-K. Factors Involved in Welded Shipbuilding. E. W. Ansell. *Welding & Metal Fabrication,* v. 20, June 1952, p. 213-218.

Diagrams and photographs.
(K general, T22, ST)

452-K. Inclined Fixture Spots Diesel A-Frame for Safe and Easy Welding. C. D. Lentz. *Welding Journal,* v. 31, May 1952, p. 420.
(K1, CN)

453-K. Repair Overcomes Replacement Problems. *Welding Journal,* v. 31, May 1952, p. 421.

Submerged-melt welding to repair cracks and holes in cast steel slag pots for openhearth furnaces.
(K1, CI)

454-K. Broken Casting Repaired Economically by Arc Cutting and Brazing. *Welding Journal,* v. 31, May 1952, p. 423.

Illustrates repair job on crawler-tractor part. $1305.36 and 12 days of downtime were saved. (K8, G22, CI)

455-K. Silver-Brazing Jobs. K. R. Shepard. *Welding Journal,* v. 31, May 1952, p. 424-425.

Diagrams show poor and good joint designs. Table shows properties of several silver-brazing alloys. Recommended procedures for Cu tubing, food containers and dairy equipment (Monel or stainless.)
(K8, Cu. SG-f, Ni, SS)

456-K. Nickel-Bronze Gear Repaired by Inert-Gas-Shielded Arc Welding. *Welding Journal,* v. 31, May 1952, p. 425.
(K1, Cu)

457-K. Surface Tension and the Joining of Metals. E. R. Funk and H. Udin. *Welding Journal,* v. 31, May 1952, p. 247s-252s.

Requirements of surface tension for design of brazing alloys, with reference to some industrially significant systems. Schematic diagrams. 17 ref. (K8, SG-f)

458-K. Heat Flow in Welding. A. A. Wells. *Welding Journal,* v. 31, May 1952, p. 263s-267s.

How heat-dissipation calculations can be used for predicting size of weld and how inspection of ripples on finished welds indicates heat input used. Theory and experimental verification for single-pass arc-butt welding of mild-steel plate. Graphs.
(K9, K1, CN)

459-K. Melting Rate of Coated Electrodes. J. ter Berg and A. Larigaldie. *Welding Journal,* v. 31, May 1952, p. 268s-271s.

Factors affecting melting rate. Experimental equipment and results. Tables and graphs. (K1, T5)

460-K. Electric Arc Welding of Mechanical Parts in Automobile Manufacture. (In French.) Adolph Klopfert. *L'Ossature Métallique,* v. 17, Apr. 1952, p. 189-194.

Advantages in mass production, principles of process, and use in suspension crossbars, rear axles, welded tubes, and wheel rims. Schematic diagrams and photographs. (K1, T21)

461-K. Recent Experiences in the Welding of Steel Structures. (In German.) A. Dörnen. *Schweissen und Schneiden,* v. 4, Apr. 1952, p. 95-99.

Diagrams and photographs show effects of various factors. (K general, T26, CN)

462-K. Welding in Boiler Construction. (In German.) K. H. Speth. *Schweissen und Schneiden,* v. 4, Apr. 1952, p. 101-108.

Different manual and automatic welding methods; increasing the strength of the weld by heat treating; defects and their sources; and methods of avoiding them. Tables, diagrams, photographs, and macrographs. (K1, CN)

463-K. Light Steel Structures—Sheet-Metal Construction. (In German.) W. Fricke. *Schweissen und Schneiden,* v. 4, Apr. 1952, p. 109-112.

Discussion of some important standards is exemplified by description of light-steel framework for prefabricated houses, steep and flat roof designs, steel sheathing, etc. (K general, T26, CN)

464-K. Fatigue-Bending Strength of Girders. (In German.) A. Erker. *Schweissen und Schneiden,* v. 4, Apr. 1952, p. 112-115.

Tests on welded and unwelded rolled girders prove that welding always reduces the fatigue resistance of the steel. In designing steel structures, allowance must be given for the notch effect of weld seams. Diagrams and tables. 10 ref. (K9, Q9, CN)

465-K. Pressure Welding of Metals, Especially of Aluminum. (In German.) Werner Hummitzsch. *Schweisstechnik,* v. 6, Apr. 1952, p. 37-44.

Reviews pressure welding or cold welding on the basis of the literature. Types of weldments; preparation of the surfaces to be welded; time, temperature and pressure required; and mechanical properties of the weldments. Diagrams, graphs, and micrographs. (K5, A1)

466-K. Classification of Electrodes on the Basis of Their Welding Properties. (In German.) G. Westendorp. *Smit Mededelingen,* v. 7, Jan.-Mar. 1952, p. 19-22.

Author's opinion is that existing systems in use in various countries are inadequate to describe adequately all the properties necessary to make a practical choice for a given welding job. A new classification system. (K1, T5)

467-K. Investigation of Welds Between Stainless and Low-Carbon Steel. (In Russian.) N. Iu. Pal'chuk. *Avtogennoe Delo,* v. 22, Dec. 1951, p. 1-4.

Chemical composition, mechanical strength, and corrosion resistance of various combinations of the two materials were investigated. Data are tabulated. (K general, Q23, R general, CN, SS)

468-K. Automatic Welding of Pipelines by Rotary Butt Welding. (In Russian.) V. K. Ivanov. *Avtogennoe Delo,* v. 22, Dec. 1951, p. 4-7.

Method and conditions. Data are tabulated. Diagrams illustrate procedure. (K1, CN)

469-K. Influence of the Composition of Aluminum Alloys on Their Tendency Toward Formation of Cracks During Gas Welding. (In Russian.) S. V. Avakian and N. F. Lashko. *Avtogennoe Delo,* v. 22, Dec. 1951, p. 7-9.

Metallographic studies and results. (K2, A1)

470-K. Local Induction Preheating During Arc Welding of Sheet Steel. (In Russian.) L. N. Belov. *Avtogennoe Delo,* v. 22, Dec. 1951, p.9-11.

See abstract of condensed English version, *Engineers Digest,* item 311-K, 1952. (K1, CN, AY)

471-K. The Nature of Nonfusion During Spot Welding. (In Russian.) D. S. Balkovets. *Avtogennoe Delo,* v. 22, Dec. 1951, p. 12-13.

A study was made of defective spot welds in various steels and nonferrous alloys. A test for lack of fusion using the electroconductivity of the weld. (K3)

472-K. Electrodes for Building-Up of Dies. (In Russian.) P. S. Turkin. *Avtogennoe Delo,* v. 22, Dec. 1951, p. 13-16.

Conditions and compositions of the coatings required for low-alloy welding rods to be used for building-up drawing dies. Tables and graphs. (K1, L24, T5, AY)

473-K. Effect of Hygroscopic Moisture of the Coating on Certain Properties of Electrodes. (In Russian.) E. D. Lonskii. *Avtogennoe Delo,* v. 22, Dec. 1951, p. 17-19.

A detailed study was made of moisture in various electrode coatings in relation to humidity and other atmospheric conditions. Tables and graphs. (K1, T5)

474-K. Contact Butt Welding of Tubes With Repeated Upsetting. (In Russian.) I. D. Davydenko. *Avtogen-*

noe Delo, v. 22, Dec. 1951, p. 20.

The butt welding of carbon steel boiler tubes, and techniques for improving the quality of the welds. (K1, CN)

475-K. Measuring and Recording Welding Currents During Contact Welding. (In Russian.) A. A. Batovrin. *Avtogennoe Delo,* v. 22, Dec. 1951, p. 21-23.

The problems and equipment for obtaining the required data. (K1)

476-K. The Use of Non-Synchronous Interrupters for Spot Welding Stainless Steels. (In Russian.) Z. N. Getselev. *Avtogennoe Delo,* v. 22, Dec. 1951, p. 23-24.

(K3, SS)

477-K. New Method of Arc Welding Cast Iron. (In Russian.) K. K. Khrenov and F. S. Vol'fovskaia. *Avtogennoe Delo,* v. 23, Jan. 1952, p. 3-6.

The brazing of cast iron with Cu or Al bronzes. Includes results of bend tests and photomicrographs. (K1, Q5, C1)

478-K. New Method of Automatic Regulation and Control of Flash Welding. (In Russian.) A. S. Gel'man. *Avtogennoe* Delo, v. 23, Jan. 1952, p. 6-10.

A pneumatic control for flash welders which is similar to American air-hydraulic, cam-driven, flash welding machines. (K3)

479-K. Rectification of Current During Argon-Arc Welding. (In Russian.) *Avtogennoe Delo,* v. 23, Jan. 1952, p. 10-14.

The behavior of various metals as electrodes. Experimental data are charted. (K1)

480-K. Flash Welding of Dissimilar Metals. (In Russian.) G. V. Nedzvetskii. *Avtogennoe Delo,* v. 23, Jan. 1952, p. 14-16.

Tests were made by flash welding steel to copper, steel to brass, copper to aluminum, and aluminum to brass. Structures of the welds are illustrated. (K3, ST, Cu, Al)

481-K. The Use of Powdered Steel From Grinding Waste in Welding Electrodes. (In Russian.) V. G. Chernashkin and A. M. Gofner. *Avtogennoe Delo,* v. 23, Jan. 1952, p. 20-24.

Reclamation of steel powder from grinding waste and its use in electrode coatings. Experimental data from tests made with such electrodes are tabulated and charted. (K1, T5, A8)

482-K. Influence of Gas Pressure Welding on the Quality of Welds. (In Russian.) S. M. Skorodzievskii. *Avtogennoe Delo,* v. 23, Jan. 1952, p. 24-26.

Bend tests were made on specimens taken from the top, bottom, and sides of butt-welded steel tubes. Data are charted and illustrated. (K2, Q5, ST)

483-K. Welding With Multi-Electrode "Bundles". (In Russian.) M. G. Golovintsev. *Avtogennoe Delo,* v. 23, Jan. 1952, p. 28-29.

Use of the process in various industries. (K1)

484-K. The Problem of Weldability of Metals. (In Russian.) S. V. Avakian and N. F. Lashko. *Avtogennoe Delo,* v. 23, Jan. 1952, p. 29-32.

The concepts of weldability of metals. Various types of crystal structures of welds. Includes photomicrographs. (K9, M26)

485-K. Distribution of Heat Flow From Welding Flames and Its Influence on the Formation of Cracks During Heating of Thin Sheets of 30 KhGS (Cromansil) Steel. (In Russian.) N. N. Rykalin and M. Kh. Shorshorov. *Avtogennoe Delo,* v. 23, Feb. 1952, p. 3-7.

Results of various directions of flame impingment on this steel. Experimental data are charted and illustrated. (K2, SS)

486-K. Automatic Welding of Brass to Steel. (In Russian.) N. A. Ol'shanskii. *Avtogennoe Delo, v. 23,* Feb. 1952, p. 7-10.

Carbon-arc welding of brass to steel, riveting, and other means of fastening for guides, bearings, and similar articles as a way of saving significant quantities of non-ferrous metals. Techniques and test data. (K general, Cu, ST)

487-K. Argon Arc Welding of Duralumin. (In Russian.) F. E. Tret'iakov. *Avtogennoe Delo,* v. 23, Feb. 1952, p. 10-13.

Use of tungsten electrodes and various filler materials. Tensile, bend, and fatigue test data are tabulated and charted. (K1, Q general, Al)

488-K. Weldability and the Tendency Toward Formation of Cracks During Welding. (In Russian.) Ia. Gintsburg. *Avtogennoe Delo,* v. 23, Feb. 1952, p. 28-29.

A general discussion. (K9)

489-K. Deformation and Stresses During Welding of Hardenable Steels. (In Russian.) V. N. Zemzin. *Avtogennoe Delo,* v. 23, Mar. 1952, p. 5-8.

Tests were made using low-alloy Cr-Ni-Mo and plain carbon steels. Mechanical properties and residual stresses after welding and various heat treatments were determined. Data are charted. (K general, Q25, Q general, AY, CN)

490-K. Influence of Type of Electrode on the Distribution of Residual Stresses in Welded Joints. (In Russian.) P. A. Mel'nikov. *Avtogennoe Delo*, v. 23, Mar. 1952, p. 9-12.

During welding of low and high-alloy steels, the type of electrode was found to have a significant influence on the value and character of the residual stresses. Data are charted and illustrated. (K1, Q25, AY, SS)

491-K. Investigation of Thermal Processes During Spot Welding by Use of Models. (In Russian.) D. S. Balkovets. *Avtogennoe Delo*, v. 23, Mar. 1952, p. 13-16.

X-shaped and V-shaped models were used. Both steel and Al were tested. Data are tabulated and charted. (K3, ST, Al)

492-K. Automatic Welding and Rapid Assembly of Spherical Tanks. (In Russian.) A. S. Fal'kevich and M. B. Gann. *Avtogennoe Delo*, v. 23, Mar. 1952, p. 19-23.

Includes diagrams and illustrations. (K1, ST)

493-K. Electrodes With "BKZ" Coatings. (In Russian.) A. I. Kuzin. *Avtogennoe Delo*, v. 23, Mar. 1952, p. 24.

Composition of above coatings on ferromanganese electrodes are given. Results of mechanical tests of weld metal produced are tabulated. (K1, T5, Fe-n)

494-K. The Development of X-Ray Standards for Shielded Arc Welds in Aluminum. J. J. Hirschfield, D. T. O'Connor, J. J. Pierce, and D. Polansky. *ASTM Bulletin*, May 1952, p. 81-91.

A set of X-ray standards was established on the basis of guided-bend and tensile tests of 300 specimens. A book of film standards was prepared incorporating a summary of the test data. Standards are intended to apply to certain types of shielded-arc welding in 2S and 3S Al plate and particularly to minecase welds. Tables, photographs, and X-radiographs.
(K1, Q27, Q5, S13, Al)

495-K. Jet Heat Exchangers Made Lighter. *Aviation Week*, v. 56, June 9, 1952, p. 58, 60-61.

Production of special Al heat exchangers made by Trane Co., La Crosse, Wis. A flux-brazing method is used to bond the core elements. (K8, T27, Al)

496-K. Solder Simplified. *Canadian Metals*, v. 15, May 1952, p. 60, 62.

Main principles to observe in order to secure consistent, high-quality joints. (K7)

497-K. Brazing Metal to Nonmetal. *Electrical Manufacturing*, v. 49, June 1952, p. 280, 282, 284, 286. (Condensed from "Metal to Nonmetallic Brazing", Library of Congress, Photoduplication Service, Publication Board Project, BP-106-109.)

New direct technique requiring no flux and using hydrides and alloys of Ti, Zr, Cb, and Ta. Method found applicable for diamonds, sapphires, carbides, ceramics, refractory oxides, glass, quartz, stainless steel, and Cr-Fe alloys. (K11, SG-f)

498-K. The Step Welding of Steel. T. Noren. *Engineers' Digest*, v. 13, May 1952, p. 156-158. (Translated and condensed from *Stahl und Eisen*, v. 72, Mar. 27, 1952, p. 347-350.)

See abstract of "The Metallurgical Principles of Stage Welding", *Machinery Lloyd* (Overseas Ed.), item 108-K, 1952. (K1, TS)

499-K. Widely Used Arc Welded Designs Give the New Look in Structural Steel. *Industry & Welding*, v. 25, June 1952, p. 33-34, 67.

Design, equipment, and procedures. (K1, CN)

500-K. Redesign Eliminates Castings, Cuts Costs 50%. Ray Zeh. *Industry & Welding*, v. 25, June 1952, p. 36-37.

Reduction in fabrication costs effected, by Game-Time, Inc.'s all welded redesign of "Pull-A-Way Merry-Go-Round." (K general, CN)

501-K. Low-Hydrogen Electrodes Now Used for Welding Armor Plate. R. J. Thomas, Jr. *Industry & Welding*, v. 25, June 1952, p. 48, 51, 69.

As a result of recent developments, it has been proven that electrodes of low-alloy steel containing 1½-2% Ni, 0.60-1.0% Mo, and 0.10-0.30% V will give stronger and tougher welds than those containing much higher amounts of critical alloys. (K1, T5, CN, AY)

502-K. Elements of Resistance Welding. A. E. Rylander. *Industry & Welding*, v. 25, June 1952, p. 54-56, 59, 82-83.

Tooling, feeding problems, and applications. Diagrams and tables. (Concluded.) (K3)

503-K. How Preheating and Controlled Cooling Improve Weld Quality. *Industry & Welding*, v. 25, June 1952, p. 62-64, 66.

Various shaped tubular electrical heating elements made by Edwin L. Wiegand Co. Relation between heating and cooling and weld quality. (K general)

504-K. Load Distribution in Riveted and Spot-Welded Joints. D. Williams. *Institution of Mechanical Engineers, Proceedings* (Applied Mechanics Div.),

v. 165, W. E. P. 66, 1951, p. 141-147; disc., p. 157-164.

A theoretical examination on the basis of experimentally obtained stress-strain curves for riveted and spot welded joints in shear. Deals with the plastic, as well as the elastic, part of the stress-strain curves. Examples of the relative behavior of the two types of joint in certain simple structural elements. Diagram and graphs. (K3, K13, Q25)

505-K. Design Stresses in Fillet Weld Connexions. F. Koenigsberger. *Institution of Mechanical Engineers, Proceedings,* (Applied Mechanics Div.), v. 165, W. E. P. 66, 1951, p. 148-157; disc., p. 157-164.

Suggests a means of determining the working loads of eccentrically loaded fillet welded joints by working out the stresses in the plastic state prevailing immediately before failure occurs. Experimental results were in close agreement with calculated results. The two differing opinions on the best arrangement of fillet weld connections joining rolled angle sections to gusset plates were also investigated. Graphs, diagrams, and photographs. (K general, Q25)

506-K. On the Relation Between Characteristics of A. C. Welders and Stability of Welding Arc. (In English.) Kohei Ando. *Japan Science Review,* v. 2, Apr. 1951, p. 59-62.

Fundamental principles. 13 ref. (K1)

507-K. General Analysis of Welding Stresses and Their Applications. (In English.) Masaki Watanabe. *Japan Science Review,* v. 2, Aug. 1951, p. 139-146.

Mathematical analysis and graphical interpretations. (K9, Q25)

508-K. Production Times for Manual Arc Welding. M. H. Wiegandt. *Machinery* (London), v. 80, May 22, 1952, p. 904-905.

Tables compiled by taking averages of a large number of observations under actual working conditions in different ships, and over a considerable period of time. (K1)

509-K. Recent Developments in Rubber to Metal Bonding. W. D. Rae. *Rubber Age and Synthetics,* v. 33, May 1952, p. 173-174. (K11)

510-K. Soldering Aluminum. *Sheet Metal Worker,* v. 43, May 1952, p. 46-48.

Methods, problems involved, and recommended procedures. Table lists commercial solders and fluxes, and their manufacturers. (K7, Al)

511-K. Strength of Bolted Assemblies. Part II. John S. Davey. *Tool Engineer,* v. 28, May 1952, p. 41-45; June 1952, p. 58-60.

For rigid and nonrigid (gasketed) joints. Tables and graphs give strength properties. (K13, Q23)

512-K. Welding Lead Linings and Coils. Harold S. Card. *Welding Engineer,* v. 37, June 1952, p. 23-25, 62, 64.

Joint designs for lead linings of steel tanks and coils. Bending methods and joining using oxyhydrogen torch. (K2, G6, Pb)

513-K. Gas-Welded Tubing for Gas Refrigerators. J. A. Ritter. *Welding Engineer,* v. 37, June 1952, p. 30-33. (A condensation.)

Procedures and equipment of Servel, Inc., Evansville, Ind. Devoted almost exclusively to oxy-acetylene welding of steel tubing. (K2, ST)

514-K. Glass Tape Backs up Welds for Jet Ejector. L. R. Constantine. *Welding Engineer,* v. 37, June 1952, p. 36-37.

How to insure sound welds when only one side of the seam can be welded by use of back-up tape of the same analysis as the submerged-arc flux. Metal welded is carbon steel. (K1, CN)

515-K. Ryan Simplifies Fabrication of Giant Wing Tanks Requiring 30,000 Spot Welds. Joerg Litell. *Western Metals,* v. 10, May 1952, p. 41-42.

Welding procedure in production of Al tanks. Four pairs of seam and spot welding machines are used. They have a 60-in. throat depth and can produce more than 200 spot welds per min. Cleaning of the metal. (K3, L12, Al)

516-K. Ravenna Metal Products Uses Rotating Fixtures to Speed Hand Silver Brazing. Howard E. Jackson. *Western Metals,* v. 10, May 1952, p. 46-47.

Technique at plant in Seattle. (K8)

517-K. Thorough Analysis Plus Necessary Tests Makes Production Runs Pay Off at Automatic Welding. Fred M. Burt. *Western Metals,* v. 10, May 1952, p. 49-51.

Examples of job analysis as conducted at Automatic Welding Co., Inc., Los Angeles. Includes welding of SAE 4140 steel forgings, seam welding Al-alloy tubing, and welding fully assembled tractor rails. (K general, A6, AY, CN, Al)

518-K. A New Electric Arc Welding Method: The "Plurial" Process. (In French.) M. Lebrun. *Soudure et Techniques connexes,* v. 6, Mar.-Apr. 1952, p. 55-63.

Process which uses a bundle of electrodes, rather than a single one. Structural details; time of fusion. Advantages as compared to the usual method. Data are tabulated. (K1)

519-K. Recent Progress of Electric Spot Welding of Aluminum Alloys in French Aircraft Construction. (In French.) J. Faguet. *Soudure et Techniques connexes,* v. 6, Mar.-Apr. 1952, p. 69-81.

Previously abstracted from *Transactions of the Institute of Welding.* See item 669-K, 1951. (K3, A1)

520-K. Welded Trusses in Modern Light Steel Construction. (In German.) E. Bahke. *Schweissen und Schneiden,* v. 4, Mar. 1952, p. 67-79.

Choice of suitable type and shape of material, proper design, and welding methods. Tables, graphs, diagrams, and photographs. 14 ref. (K general, T26, CN)

521-K. Computing and Designing of Welded Girder Joints. (In German.) K. H. Effertz. *Schweissen und Schneiden,* v. 4, Mar. 1952, p. 80-83.

Theoretical discussion shows the importance of considering torsional and bending stresses in computing and designing girders welded to vertical walls. Diagrams and tables. (K general, T26, CN)

522-K. Advances in the Field of Welding and Cutting; Status of Welding Technique in the Soviet Union. (Continued.) *Schweissen und Schneiden,* v. 4, Mar. 1952, p. 83-86; Apr. 1952, p. 125-127.

Reviews the literature on Russian welding research. 30 ref. (K general)

523-K. High Steel Buildings in Western Germany. (In German.) H. Fricke. *Schweissen und Schneiden,* v. 4, May 1952, p. 156-164.

Photographs and drawings show structural details of welded steel structures. The recently developed semi-automatic Humboldt-Meller arc-welding process. (K1, T26, CN)

524-K. Tests for Welding Materials. *American Machinist,* v. 96, June 9, 1952, p. 169, 171, 173.

Reference sheet describing following tests for steel, used in the automotive industry: arc-weld pad for chemical analysis; all-weld-metal tension test; hydrogen test for arc-weld deposits; moisture in welding electrode coatings; and usability test for AWS Class E-XX13 electrode. Tables and diagrams. (K, ST)

525-K. Ceramic Backing for Tube Joints. Bela Ronay. *Journal of the American Society of Naval Engineers,* v. 64, May 1952, p. 359-369.

Arc-weld joint design. Root preparation, which includes the backing material, is directly related to development of ceramic backing for tube welds. Schematic diagrams and illustrations. (K1)

526-K. Strength Properties of Welds in 61S-T6 Aluminum Alloy Sheet. Louis Barrett. *Product Engineering,* v. 23, June 1952, p. 148-150.

Tensile strength of butt joints and shear strength of lap joints in Al-alloy sheet obtained with the Aircomatic inert-gas welding process where the filler wire is used for the electrode. (K1, Q23, A1)

527-K. A Survey of Modern Theory on Welding and Weldability. D. Seferian. *Sheet Metal Industries,* v. 29, June 1952, p. 529-532, 540.

Details of calculations for acid and basic slags, as found in welding electrode coatings. Graphs and tables. (To be continued.) (K9, T5)

528-K. The Interpretation of Weld Radiographs. C. Croxson. *Transactions of the Institute of Welding,* v. 15, Feb. 1952, p. 7-12.

Factors to be considered, together with some examples, mainly of welds in steel not exceeding about 1 in. in thickness and made by various electric-arc processes. Radiographs and diagrams. 11 ref. (K1, S13, ST)

529-K. Stress Distribution in Fillet Weld Connections Between Rolled Angle Sections and Gusset Plates. F. Koenigsberger and H. W. Green. *Transactions of the Institute of Welding,* v. 15, Feb. 1952, p. 13-18.

A report of preliminary work to determine whether an advantage is gained by use of particular arrangement of welds. Concludes that, under static loading conditions, no advantage is gained by using particular arrangement and that practical considerations should decide design of the welds. Three-dimensional stress diagrams and graphs. (K9, Q25, ST)

530-K. Production of Mechanized Farm Equipment. *Welding & Metal Fabrication,* v. 20, June 1952, p. 196-202.

Arc and resistance welding equipment and procedures of Massey-Harris Co., Ltd., in Scotland. (K1, K3, T3, CN)

531-K. Fabricating Modern Pressure Vessels. *Welding & Metal Fabrication,* v. 20, June 1952, p. 207-212.

Arc welding practice at G. A. Harvey & Co., London, for carbon, alloy, and stainless steels, also clad steels. Part 2. (K1, ST)

532-K. The "Dot Weld" Process. J. A. Cooper. *Welding & Metal Fabrication,* v. 20, June 1952, p. 218-219.

Introduction of above method in Britain. Photographs and micrographs. (K6)

533-K. M. L. "Queen Elizabeth". *Welding & Metal Fabrication,* v. 20, June 1952, p. 228-229.

Welding in construction of Al alloy superstructure of Thames pleasure vessel. (K general, T22, Al)

534-K. Correlation of Weldability Tests With Structural Joints. Part I. Investigations With Tests of the Restrained Fillet Type. C. L. M. Cottrell. *Welding Research,* v. 6, Feb. 1952, p. 2r-12r.

Effect of rate of cooling on the initiation of hard-zone cracking was studied. Chief material used was a low-alloy Mn-Mo steel. Tables, diagrams, graphs, and photographs. (To be continued.) (K9, AY)

535-K. The Weldability and Weld Strength of Some Magnesium Alloy Sheet Materials. J. G. Ball. *Welding Research,* v. 6, Feb. 1952, p. 13r-26r.

As applied to oxy-acetylene and argon-arc hand welding. Alloying elements were: Al, Zn, Mn, Ca, Ce, and Zr. Tables, diagrams, and micrographs. (K9, Q23, Mg)

536-K. A New Double-Fillet Test for Hot-Cracking. E. G. P. Hinds. *Welding Research,* v. 6, Feb. 1952, p. 27r-28r.

New test is much more severe than the T-test, which it is intended to replace. The material is mild-steel plate. Diagrams and table. (K9, CN)

537-K. (Book) **Modern Arc Welding.** 544 pages. Hobart Trade School, Hobart Square, Troy, Ohio. $3.00.

Practical textbook on the procedure and practice of arc welding for the practicing engineer, welding operator, and designer. The 28 chapters are divided into five sections. Part 1: Basic procedures and development of electric arc welding. Part 2: A self-study course. Part 3: Principles and practical operations of carbon-arc welding. Part 4: Other welding processes. Part 5: Welding terms and definitions. More than 600 photographs, diagrams, and charts. (K1)

538-K. (Book) **The Welding, Brazing, and Soldering of Copper and Its Alloys.** Herts Radlett. 1951. 188 pages. Copper Development Association, Kendals Hall, Radlett, Hertfordshire, England. Free.

Metallurgical and physical properties and main welding methods. Chapters are devoted to welding of Cu, Cu alloys, and bronze, brazing and silver soldering and some notes on Cu as a brazing material for steel. Soft soldering of Cu and its alloys, additional joining and related processes, and the joining of dissimilar metals. Photographs, line drawings, tables, and charts. (K general, Cu)

539-K. (Book) **Welding: Productivity Report.** 74 pages. Aug. 1951. Anglo-American Council on Productivity, 2 Park Ave., New York City.

Report prepared by a team of British specialists which visited the U. S. in 1950 covers mechanical handling, materials for welding, welding processes and equipment, inspection and testing, working conditions, costs and productivity, and welding in a number of specific industries. Recommendations for British industry. (K general)

540-K. (Book) **Voprosy Teorii Kontaktnoi Svarki.** (Problems in the Theory of Contact Welding.) K. A. Kochergin. 103 pages. 1950. Government Scientific-Technical Publishing House for Machine-Industry Literature, Moscow and Leningrad, U.S.S.R.

The basic electrothermal problems of the most frequently used processes of contact welding of steel. Methods for determination of optimum conditions of operation for each method. 22 ref. (K1, ST)

541-K. Ore Bridge Span Uses Arc Welding for the First Time. H. E. Cable. *Iron and Steel Engineer,* v. 29, June 1952, p. 116, 118, 120.

Span fabricated by Dominion Foundries and Steel Co., Ltd., Hamilton, Ontario. (K1, T26, CN)

542-K. Strength of Bolted Assemblies. John S. Davey. *Machine Design,* v. 24, June 1952, p. 248, 250, 252, 254, 256, 258, 260.

See abstract from *Tool Engineer;* item 511-K, 1952. (K13, Q23)

543-K. The Welding of High-Pressure Pipes. *Metal Progress,* v. 61, Apr. 1952, p. 154, 156. (Translated and condensed from "Welding Problems With High-Pressure Pipe Lines", H. Hauttmann, *Berg- und Hüttenmännischen Monatshefte,* v. 95, Dec. 1950, p. 314-317.)

Boiler plate originally used for the pipeline was susceptible to brittle fracture. As a result of weld-bending tests, an "Aldur" steel was developed which prevents this type of cracks. (K9, ST)

544-K. Flow of Liquid Metals on Solid Metal Surfaces. *Metal Progress,* v. 67, June 1952, p. 144, 146, 148. Condensed from "The Flow of Liquid Metals on Solid Metal Surfaces and Its Relation to Soldering, Brazing, and Hot-Dip Coatings", G.L.J. Bailey and H. C. Watkins.)

Previously abstracted from *Journal of the Institute of Metals.* See item 626-K, 1951.

(K7, K8, L16, Pb, Fe, Cu, Sn, SG-f)

545-K. Effect of Temperatures From −70° to 600° F on Strength of Adhesive-Bonded Lap Shear Specimens of Clad 24S-T3 Aluminum Alloy and of Cotton- and Glass-Fabric Plastic Laminates. H. W. Eickner, W. Z. Olson, and R. F. Blomquist. *National Advisory Committee for Aeronautics,* Technical Note 2717, June 1952, 26 pages.

Performance of 14 commercial adhesives under above conditions was evaluated, also that of seven commercial adhesives at −70 to 250° F., in lap joints of cotton-fabric-phenolic laminate to itself, of glass-fabric-polyester laminate to itself, and in joints of each of these laminates to clad Al. Experimental set-up diagrammed; data tabulated. (K11, Al)

546-K. Welding Tantalum. Adrian H. Daane. *Review of Scientific Instruments,* v. 23, May 1952, p. 245-246.

Electrodes made of several materials were tested, including W, Ta, and graphite. Graphite gave the most stable and controllable arc. Diagrams. (K1, Ta, W)

547-K. Nodular Cast Iron Welds Hard to Machine. E. F. Davis and E. L. Layland. *Steel,* v. 130, June 23, 1952, p. 78-79.

Study shows that electric arc welds of one type of nodular cast iron approach the strength of the parent metal, but lack ductility, and are extremely hard to machine. Effects of preheating and post annealing on mechanical properties and soundness of such welds joining nodular iron to itself, and to mild steel with two types of electrodes. Extensive tables. (K1, G17, CI, CN)

548-K. Effect of Taper on Screw-Thread Load Distribution. E. E. Stoeckly and H. J. Macke. *Transactions of the American Society of Mechanical Engineers,* v. 74, Jan. 1952, p. 103-112.

Load distribution on the threads of bolts and nuts, made in the conventional constant-pitch manner and with tapered threads, was determined experimentally and theoretically. Results indicate that substantial improvement in thread-load distribution can be made by tapering the thread of either the bolt or nut. Material improvement in bolting strength is otbained in applications normally conducive to little plastic flow and thus liable to brittle fractures, with dynamic loads or static loads at elevated temperatures. Operational experiences. (K13, Q23)

549-K. Steel Mill Maintenance Welding During a Defense Period. R. L. Deily. *Welding Journal,* v. 31, June 1952, v. 476-478.

Organization and planning of steelmill maintenance with a typical application. (K general, D general, CN)

550-K. Characteristics of Submerged Arc Welding With Three-Phase Power. E. A. Clapp and N. G. Schreiner. *Welding Journal,* v. 31, June 1952, p. 479-485.

Submerged-melt welding operating with 3-phase welding power applied to two welding rods arranged in close tandem so as to deposit weld metal into a common welding pool offers many advantages in some applications over other methods of submerged-arc welding. Data on typical welds in steel plate. (K1, CN)

551-K. Oxyacetylene Welding and Cutting as Applied to Railroads. W. D. Waldron. *Welding Journal,* v. 31, June 1952, p. 486-491.

Repair and fabrication of parts for passenger and freight cars and of steam and diesel locomotives. (K2, G22, ST)

552-K. Hydrogen in Mild-Steel Weld Metal. A. L. Schaeffler, H. C. Campbell, and H. Thielsch. *Welding Journal,* v. 31, June 1952, p. 283s-309s.

Reviews of published and unpublished information on occurrence and effects of H_2 in mild steel weld deposits made by shielded-metal-arc welding with covered electrodes; H_2 in commercial electrodes; effects of H_2 on porosity, cracking, fisheyes, and mechanical properties; welding considerations; practical applications, and engineering recommendations. Tables, graphs, diagrams, and macrographs. 183 ref. (K1, K9, CN)

553-K. Brazing Hydromechanics. E. R. Funk and H. Udin. *Welding Journal,* v. 31, June 1952, p. 310s-316s.

Factors affecting rate of completion of a brazed joint are related to physical constants of the brazed metal, its surface tension, and joint dimensions. A study is presented of flow through two types of capillary dams. These considerations are modified to include the more practical case of fluxed joints. Effects on design for brazing. (K8)

554-K. The Suitability of Various Steels for Flash Welding. Erich Hormann. *Welding Journal,* v. 31, June 1952, p. 318s-320s. (Translated and condensed.)

Previously abstracted from *Stahl und Eisen.* See item 228-K, 1952. (K3, K1, Q general, AY, SS)

555-K. (German) **Double Spot Welding for Light Metal Construction.** K. Ruppin. *Metall,* v. 6, June 1952, p. 308-309.

A specialized welding machine. Structural details and advantages. (K3, Al)

556-K. (Russian.) **Automatic Argon-Arc Welding With Mechanical Feed of the Wire Electrode.** A. Ia. Brodskii. *Avtogennoe Delo,* v. 23, Apr. 1952, p. 8-11.

Equipment and its use with 18-9 stainless-steel wire. (K1, SS)

557-K. (Russian.) **Influence of Certain Structural Factors on the Operation of Injection Welding Torches.** V. D. Nechaev. *Avtogennoe Delo,* v. 23, Apr. 1952, p. 11-15.

Detailed discussion. Data are tabulated. (K2)

558-K. (Russian.) **Automatic Welding and Gas Cutting in Mass Production of Tractors.** E. A. Levchenko. *Avtogennoe Delo,* v. 23, Apr. 1952, p. 25-28.

Equipment and procedures. (K2, G22, CN)

559-K. Nondestructive Determination of Mechanical Properties and Deterioration of Adhesives. Albert G. H. Dietz, Herman N. Bockstruck, and George Epstein. *American Society for Testing Materials,* Preprint 134, 1952, 14 pages.

Experimental work done at MIT for U. S. Army Ordnance. Emphasis is on nonbiological factors leading to deterioration of such adhesives, particularly in metal-to-metal bonds. Two types of adhesives were tested in joining of Al alloy and stainless steel rods. Apparatus and results, charted and tabulated. (K12)

560-K. Welding Magnesium by the Aircomatic Process. Harold Robinson. *Canadian Metals,* v. 15, June 1952, p. 48, 50.

Essentially an inert gas-shielded metal-arc process consisting of a continuously fed, consumable, bare electrode wire. The shielding gas, A or He, is fed through a hand gun simultaneously with the wire, forming an envelope of protective gas around the arc and welding area, eliminating the necessity of flux and the formation of slag. Data on the process for welding Mg. (K1, Mg)

561-K. Connections for Aluminum Conductors. *Electrical Manufacturing,* v. 50, July 1952, p. 226, 228, 230, 232.

Report on an NEMA meeting concerning technical problems in terminating Al conductors to electrical equipment. (K13, T1, Al)

562-K. Seventeen Cr Stainless Replaces 18-8 in Many Weldments. *Iron Age,* G. E. Linnert, v. 169, June 26, 1952, p. 97-100; v. 170, July 3, 1952, p. 128-132.

Part I: Steels with 17% Cr properly handled show as good corrosion resistance as 18-8 in welded parts. Ferrite grain growth and martensite will reduce joint properties if allowed to form but both can be controlled. The Ti-stabilized 17% grade is easier to control when the right welding practice is used. Both 430 and 430-Ti show less distortion in welding than 18-8. Part II: Gas-torch welding should not be used on Types 430 or 430T grades as grain growth or carbon pickup may occur. Shielded welding prevents loss of Ti on 430T. When using 430, preheating electrodes minimizes the pinhole conditions sometimes encountered. When spot welding cross-wire joints a mutual indention of 20-30% of the wire diameter is used and proper current from 1-10 cycles is then selected. Tables and photomicrographs.
(K general, Q general, R general, SS)

563-K. Triple Multi-Point Welding Machine for Automobile Seats. R. M. Herbert. *Machinery* (London), v. 80, June 19, 1952, p. 1079-1080.

Machine and its operation at Philips Electrical, Ltd. The machine is a 3-station, automatic resistance welding type, with electronic controls. (K3)

564-K. Composite Forgings Cut Tooling Costs. *Overseas Engineer,* v. 25, July 1952, p. 426-427.

System of composite forgings consists of flash-butt welding a section of toolsteel to a mild steel base, both of which have been previously flame-cut to the required shape. Sections can be manufactured up to 36 in. long by 12 in. wide by 10 in. high, with a maximum weld area of 80 sq. in. (K3, CN, TS)

565-K. 1952 Product and Statistical Review Number. *Welding Engineer,* v. 37, mid-June 1952, 156 pages.

Statistical review of the welding industry in 1951; product and literature review; product classification list; and trade name index.
(K general, A4, A10)

566-K. Modern Methods for Copper Brazing. Fred M. Burt. *Welding Engineer,* v. 37, July 1952, p. 30-34.

Materials, advantages, sizes and shapes, limitations, and economies of production furnace brazing as practiced at Fabriform Metal Products, Inc., Los Angeles. Low-carbon steels, irons, and many alloy steels can be brazed. Includes data on joint strength.
(K8, Q23, Cu, CN, Fe, AY)

567-K. Joins Heavy Aluminum. *Welding Engineer,* v. 37, July 1952, p. 35.

Spot welding operations at Republic Aviation Corp., Long Island, N. Y. A new large spot-welding machine can join high-strength Al alloys in combinations of thickness up to ¼-⅜ in. (K3, Al)

568-K. Spot and Seam Welding at Northrop Aircraft. Thomas A. Dickinson. *Welding Engineer,* v. 37, July 1952, p. 40-42, 62.

Procedures. Equipment includes a spot-seam welder capable of welding two 24ST or 75ST Al sheets of ⅛ in. maximum thickness to each other. Quality-control program. (K3, S12, Al)

569-K. When to Design for Cast-Welded Construction. Robert J. Franck. *Welding Engineer,* v. 37, July 1952, p. 43.

The production of drive-spacer housings by Superior Steel and Malleable Castings Co., Benton Harbor, Mich. (K general, E general, ST)

570-K. Torch Maintenance for Diesels. W. D. Waldron. *Welding Engineer,* v. 37, July 1952, p. 44-46, 66.

See abstract of "Oxyacetylene Welding and Cutting as Applied to Railroads", *Welding Journal,* item 551-K, 1952. (K2, G22, ST)

571-K. (German.) **Welding Aluminum Parts in Chemical-Apparatus Construction.** A. Müller-Busse. *Chemie-Ingenieur-Technik,* v. 24, May 1952, p. 288-293.

Various methods of welding Al and the promising prospects of inert-gas shielded welding. Graphs, diagrams, and photographs. 12 ref. (K1, Al)

572-K. (German.) **Joining of Metals to Each Other or to Other Materials.** K. Meyerhans. *Metall,* v. 6, May 1952, p. 229-240.

Reviews the possibilities of joining metals by means of organic binding agents, particularly pressure-setting agents. Examples of the use of such plastics for various tasks in industry. Their advantages, and properties of the bonds. Tables, diagrams, and photographs. (K12)

573-K. (German.) **Present-Day Steel Bridge Construction, With Emphasis on Welding.** K. Lange. *Schweissen und Schneiden,* v. 4, June 1952, p. 173-182.

Modern developments, especially with respect to railway bridges. Manual and automatic welding. Numerous diagrams. (K1, T26, CN)

574-K. (German.) **Construction of a Milk-Drying Tower of Pure Aluminum With the Help of Four-Plate Weldments.** R. Pfeiffer. *Schweissen und Schneiden,* v. 4, June 1952, p. 182-187.

Special problems presented. Welding experiments and the final method of construction. Photographs and diagrams. (K1, Al)

575-K. (German.) **Influence of Welding Technology on the Construction of Building Elements in Ship Construction.** H. Dohrmann. *Schweissen und Schneiden,* v. 4, June 1952, p. 187-194.

Slow acceptance of welded structures in ship construction. The quality of riveted and welded elements is compared; the value of welded structural elements for the safety of the ship. Diagrams and photographs. (K general, T22, CN)

576-K. (German.) **Electric Multispot Welding.** H. W. Roth. *Schweissen und Schneiden,* v. 4, June 1952, p. 194-198.

Various types of modern equipment, particularly the multispot process with secondary current reversal. (K3)

577-K. (German.) **Application of Welding Technique to Machinery and Equipment for Mining.** K. L. Zeyen. *Schweissen und Schneiden,* v. 4, June 1952, p. 211-215.

Welding electrodes for manual arc welding, and application of this technique to mining equipment. Tables, macrographs, and photographs. (K1)

578-K. (German.) **Experiments on the Cold Pressure Welding of Metals.** Wilhelm Hofmann and Jürgen Ruge. *Zeitschrift für Metallkunde,* v. 43, May 1952, p. 133-137.

Dependence of tensile strength of the welds upon the materials welded, degree of deformation, and welding temperature. Application of the method to butt welds. Tables, charts, and micrographs. (K5)

579-K. (German.) **Fluxing Agents for Soft Soldering.** C. G. Keel and G. B. Brubacher. *Zeitschrift für Schweisstechnik, Journal de la Soudure,* v. 42, May 1952, p. 95-101.

Reviews recent patent literature concerning the more important fluxing agents developed up to 1950. Table gives chemical composition, properties, applications, and references (mostly patents), for 37 different types. (K7)

580-K. (Swedish.) **Step Welding of Toolsteels and of Certain Hardening and Tempering Structural Alloy Steels.** Tore Noren. *Jernkontorets Annaler,* v. 136, No. 4, 1952, p. 74-89.

By the aid of TTT-diagrams for steels of high hardenability, it was found possible to calculate suitable welding conditions leading to decreased cracking tendency and to

advantages from the point of view of heat treating. These principles were applied in developing the step welding method, in which welding takes place after austenitizing the base material followed by quenching to a temperature, generally about 500° C., where transformation velocity is so low that the steel remains austenitic during welding. The steel is afterwards cooled and tempered, and heat treatment is adjusted to properties of the base material and the weld. Step welding may be applied to hard surfacing in general and also to the welding of slowly transforming structural steels. Graphs, table, micrographs, and photographs. (K9, N8, AY)

581-K. Metal Bonding: Developments in the Redux Process; Application of the Vacuum Technique. G. S. Newell. *Aircraft Production,* v. 14, July 1952, p. 220-223.
17 references. (K12)

582-K. Multistory Welding. *Architectural Forum,* v. 96, June 1952, p. 155.
New arc-welding technique which reduces shrinkage and simplifies plumbing the steel frame. (K1, T26, CN)

583-K. Plastic Patching for Steel Piping. Thomas W. McConville. *Bureau of Ships Journal,* v. 1, June 1952, p. 15-17.
Navy foresees many uses in making emergency repairs of battle damage. A ruptured water main was repaired in approximately 30 min., and the patch was strong enough to withstand a pressure of 300 lb. (K11)

584-K. Wanted: Information on Aluminum Connections. J. P. Hayward. *Electrical World,* v. 138, July 14, 1952, p. 137-138.
Need for economical splicing method that will last as long as the conductors—and still maintain high electrical conductivity when exposed to salt spray and industrial atmospheres. (K13, T1, R3, Al)

585-K. The What, Why, and How of Connections for Aluminum. M. D. Bergan. *Electrical World,* v. 138, July 14, 1952, p. 139-142.
Merits and demerits of various types. (K general, T1, Al)

586-K. Butadiene-Methacrylic Acid Copolymers as Rubber-to-Steel Adhesives. Charles E. Fran, Gerad Kraus, and Albert J. Haefner. *Industrial and Engineering Chemistry,* v. 44, July 1952, p. 1600-1603.
Preparation and properties. 16 ref. (K11, ST)

587-K. Welding Aids Expansion at General Mills. *Industry & Welding,* v. 25, July 1952, p. 31-32.
Miscellaneous equipment and procedures. (K general)

588-K. Here's How Welding Helps "Made to Order" Production. Howard E. Jackson. *Industry & Welding,* v. 25, July 1952, p. 34-36, 81.
Welding applications used in manufacture of heavy-duty custom-built buses and trucks by Kenworth Motor Truck Corp., Seattle. Various processes and materials. (K general, T21)

589-K. Arc Cutting and Brazing Save $1305 in Repair of Cast Housing. *Industry & Welding,* v. 25, July 1952, p. 38.
(K8, G22, CI)

590-K. World's Largest Welded Spans Feature 50 Percent Weight Saving. A. F. Davis. *Industry & Welding,* v. 25, July 1952, p. 42-45.
Weight saving was possible through welded construction and a special type of beam section in new municipal auditorium in Mexico City. Illustrated. (K1, T26, CN)

591-K. Welded Air Tunnel. *Industry & Welding,* v. 25, July 1952, p. 58-59.
Construction and operating details of the fastest of three giant wind tunnels for studying supersonic flight, at NACA. Joining of forged steel disks and forged steel shaft ends. (K general, ST)

592-K. Special Fixtures Speed Sheet-metal Fabrication. G. C. Farrington. *Iron Age,* v. 170, July 10, 1952, p. 142-144.
Fixtures used in projection welding in manufacture of home-laundry equipment. (K3, ST)

593-K. Jet Engines Push Welded Molybdenum Study. Willard M. Boam. *Iron Age,* v. 170, July 10, 1952, p. 145-148.
Weldability of Mo and some Mo-W, Mo-V, Mo-Ti, and Mo-Cb alloys. Effects of He-shielded tungsten electrodes on proper welding conditions, on the problem of securing ductile welds, and on effects of welding on mechanical properties. Photomicrographs and photographs. (K1, Q general, Mo)

594-K. Aluminum Welding *Product Engineering,* v. 23, July 1952, p. 254, 256, 258, 260. (Condensed from "Good Aluminum Welding Starts With the Engineer", by R. M. Curran.)
Previously abstracted from *General Electric Review.* See item 384-K, 1952. (K general, Al)

595-K. A Survey of Modern Theory on Welding and Weldability. (Continued.) D. Séférian. *Sheet Metal Indus-*

tries, v. 29, July 1952, p. 627-634, 642.

Influence of type of electrode coating on mechanical properties of the weld metal, and related aspects including microstructure; influence of hydrogen on weld seams and in relation to various faults; and the Fe-H equilibrium. Tables, graphs, and photomicrographs. 12 ref. (To be continued.)

(K9, Q general, M27, Fe)

596-K. Automatic Flash Butt Welding in Shipyards. *Sheet Metal Industries,* v. 29, July 1952, p. 641.

A demonstration by a new machine made by the English firm, A. I. Electric Welding Machines, Ltd. (K3)

597-K. Titanium Alloys Flash Welded Easily. I. A. Oehler. *Steel,* v. 131, July 14, 1952, p. 84-85.

Satisfactory welds can be produced on conventional hydraulic machines if material is of uniform structure and if welded parts are annealed immediately after welding. (K3, Ti)

598-K. Automatic Welding Devices Speed Cradle Production at Pacific Car. Howard E. Jackson. *Western Metals,* v. 10, June 1952, p. 48-50.

Mass-production welding of structural steel, 800-lb., pot-supporting cradles at Pacific Car & Foundry Co., Wenatchee, Wash., (K1, CN)

599-K. (Book) **Design Manual for the Repair of Aluminum Alloy Structures.** Howard M. Jensen. 208 pages. 1952. Johnson Research Corp. $3.50.

Almost every repair that might be required on an Al alloy structure is covered. Each repair has been accurately designed and stress analyzed. (K general, T26, Al)

600-K. (Book) **Gas Welding of Aluminium.** 68 pages. Aluminium Development Association, 33 Grosvenor St., London W. 1, England. (Information Bulletin No. 5, Revised.) 2s.

Modifications to fusion welding procedures that result from the characteristics of aluminum. Various gas welding processes—fuel gases; flame types; equipment; fluxes, and filler metal. Welding procedure—preparation of parent metal, techniques for horizontal and vertical welding, and post-welding treatment. Short notes on atomic hydrogen welding and other processes. Inspection of welds, properties of gas welds, and data for estimating costs. Appendixes give the specified composition of Al welding wire and a table of aircraft specification numbers. (K2, Al)

601-K. (Book) **Modern Welding Practice. Ed. 2.** Andrew D. Althouse, Carl H. Turnquist, George E. Tabraham, and Burl E. Ott. 498 pages. 1951. Goodheart-Willcox Co., Chicago.

Nontechnical description of all types of gas and electric welding, heat treating, and metal cutting including submerged-arc and inert-gas welding, arc-oxygen cutting, underwater cutting and welding, stud welding, sprayed hard surfacing, welding tool and die steels, and power and flux cutting of high-alloy steels.

(K general, G22, J2, L24)

602-K. (Book) **Welding Practice. Vol. 3. Welding of Non-Ferrous Metals.** E. Fuchs and H. Bradley, editors. 183 pages. Butterworths Scientific Publications, 4-6 Bell Yard, Temple Bar, London W.C. 2, England. 22s., 6d.

General arrangement follows that of the previous volumes. Broad advice on procedure, technique, process and design is of value to the industry, designer, works foreman, instructor welder, and student alike. Bibliography at the end of each chapter. (K general, EG-a)

603-K. Flash Welding Titanium Alloys. I. A. Oehler. *Canadian Metals,* v. 15, July 1952, p. 48.

See abstract of "Titanium Alloys Flash Welded Easily", *Steel;* item 597-K, 1952. (K3, Ti)

604-K. Ferritic Welding Electrodes Save Alloy, Give Better Welds. Z. J. Fabrykowski. *Iron Age,* v. 170, July 24, 1952, p. 93-97.

Savings in strategic alloys of about 85% were obtained by using ferritic instead of austenitic rods by Army Ordnance. The practice is being used on U. S. military vehicles for steel-plate thicknesses up to $\frac{5}{8}$ in. where ballistic tests must be met. Mechanical properties of welds are tabulated. All major alloying elements are in coating. (K1, T5, Q general, ST)

605-K. Production Problems. XVII. Broken Spring Clips. *Iron & Steel,* v. 25, July 1952, p. 319-320.

Discusses breakage problems resulting from variation in spot welding procedure. The clips are made of 0.45-0.50% carbon steel. Photomicrographs. (K3, CN)

606-K. Lead-Tin Alloy Plating for Solderability. J. W. Cuthbertson. *Journal of the Electrodepositors' Technical Society,* v. 26, 1950, p. 99-106; disc., p. 125-135.

Present position of electrodeposited tin as a medium to aid soldering of brass, copper, and steel. Possible advantages of Pb-Sn alloy coatings, history, constitution of plating baths, addition agents, operating conditions, and solderability of deposits. 10 ref. (K7, L17, Pb, Cu, ST)

607-K. Huge Fuel Tanks for the Stratojet Bomber. Lawrence M. Limbach. *Machinery* (American), v. 58, July 1952, p. 204-208.

Mass production, at Ryan Aeronautical Co., San Diego, of very large Al external fuel tanks by electric resistance welding. Includes information on cleaning. (K3, L12, Al)

608-K. A Portable Spot Welder. *Machinery Lloyd* (Overseas Ed.), v. 24, July 5, 1952, p. 95.

Welder made by Ring Motors, Ltd., Manchester, England can weld two pieces of 14 gage sheet and has adjustable tip pressure up to 500 lb. (K3)

609-K. Lead Welded by Inert-Gas Shielded-Arc Process. *Materials & Methods,* v. 36, July 1952, p. 97.

Advantages of this method for joining lead. (K1, Pb)

610-K. Low-Temperature Embrittlement of Welds. *Metal Progress,* v. 62, July 1952, p. 166, 168, 170, 172, 174. (Condensed from "Microcracks and the Low-Temperature Cooling Rate Embrittlement of Welds", A. E. Flanigan and M. Kaufman.)

Previously abstracted from *Welding Journal.* See item 107-K, 1952 (K9, Q23, CN)

611-K. How to Solder Stainless Steel. E. M. Rains. *Sheet Metal Worker,* v. 43, July 1952, p. 52-53.

Pictorial presentation. (K7, SS)

612-K. Resistance Welding Applications Increase. *Steel,* v. 131, July 21, 1952, p. 91-96, 98.

A special report to show wide possibilities of resistance welding as a means of cutting fabrication costs. The process in general and its six types; welding controls; power supply; and electrodes. Lists metals that can be resistance welded and numerous applications. (K3)

613-K. Industrial Brazing: Torch Brazing. E. V. Beatson and H. R. Brooker. *Welding and Metal Fabrication,* v. 20, June 1952, p. 220-223; July 1952, p. 248-253.

Recommended procedures. (K8)

614-K. Rolling-Stock Construction at Eastleigh. *Welding and Metal Fabrication,* v. 20, July 1952, p. 236-240.

Various welding operations including carbon-arc, metal-arc, spot, and "puddle" welding processes. Last type involves a burning-through step which eliminates drilling holes. (K1, K3, K6)

615-K. High Quality Pipe Butt Welding Without Backing Strips. A. J. P. Tucker. *Welding and Metal Fabrication,* v. 20, July 1952, p. 253-257.

A method of making fusion butt welds in mild steel piping by a metal-arc process which allows good control of root penetration. Methods of testing the welds and uses of the process. Applications of the argon-arc process to the welding of piping of 18% Cr, 8% Ni, and the 3% Cr-Mo types. Photographs and tables. (K1, ST, SS, AY)

616-K. Garage Welding Modern Car Bodies. Cyril C. Gee. *Welding and Metal Fabrication,* v. 20, July 1952, p. 262-263.

Technique of replacing, rather than repairing, automobile panels by spot welding. Equipment and typical procedure. (K3, CN)

617-K. A Survey of Arc Welding in Gaseous Atmosphere. *Welding Journal,* v. 31, July 1952, p. 349s-352s. (Translated from *Soudure et Techniques connexes,* v. 5, 1951, p. 179-181.)

Historical review of successful and unsuccessful attempts to provide arc shielding of the molten weld metal from atmospheric contamination. 26 ref. (K1)

618-K. Slope Taper Control in Spot Welding 24ST Aluminum. I. W. Johnson. *Welding Journal,* v. 31, July 1952, p. 549-551.

Addition of taper control to the standard slope control greatly simplifies spot welding of material such as 24S-T Al. (K3, Al)

619-K. Welding Light-Gage Tubing in Gas Refrigerators. J. A. Ritter. *Welding Journal,* v. 31, July 1952, p. 552-560.

Manufacture of the refrigerating unit installed in the Servel household refrigerator including material, personnel, and methods. Material is SAE 1010 steel and process is oxy-acetylene welding. (K2, CN)

620-K. Military Aeronautical Spot and Seam-Welding Specifications. J. Maltz and N. E. Promisel. *Welding Journal,* v. 31, July 1952, p. 561-566.

Development of above specifications. (K3, S22)

621-K. Process Control for Resistance Welding Under Government Specifications. Frank G. Harkins. *Welding Journal,* v. 31, July 1952, p. 567-574.

A realistic approach to conformance with MIL specifications 6858 and 6860 which deal with resistance welding of ferrous materials, Ni and Co-base alloys, and light metals. Data from 15 machines involving 3280 tension-shear tests and 570 macro-etch specimens on 10 gages of material. A relationship between nugget diameter and tension-shear value has been established. A tentative statistical-control pro-

cedure which will not permit production of substandard welding. (K3, S22)

622-K. Inert-Gas-Shielded Arc Consumable Electrode Welding. H. E. Rockefeller. *Welding Journal,* v. 31, July 1952, p. 575-586.

The sigma welding—equipment, gases, electrodes, current, and some interesting applications. Specifically covers Al, Cu, carbon and stainless steels. Numerous diagrams, tables, graphs, and illustrations. (K1, Al, Cu, CN, SS)

623-K. Problems and Equipment in Aircraft Spot Welding. J. R. Fullerton. *Welding Journal,* v. 31, July 1952, p. 586-591.

Equipment used by Ryan Aeronautical Co. for resistance welding applications. Advantages and limitations of each type. (K3)

624-K. New Austrian Welding Standards. Hans Melhardt. *Welding Journal,* v. 31, July 1952, p. 592-594. (Translated and condensed from *Schweisstechnik,* v. 6, 1952, p. 1-7; 21-36.)

Diagrams, graphs, and tables. 10 ref. (K general, S22)

625-K. Recording Voltmeter Checks Quality of Automatic Welds. George A. Hatfield. *Welding Journal,* v. 31, July 1952, p. 600-601.

Procedure of National Supply Co. for submerged-arc welding of steel rings to steel pipes to form shoulders. (K1, CN)

626-K. (Dutch.) **The Smit-Unionmelt Manual Welding Apparatus.** P. J. Verlee. *Smit Mededelingen,* v. 7, Apr.-June 1952, p. 45-49. (K1)

627-K. (Dutch.) **Relationship of Welding Current Strength to Translucency Factors in Welding Fluxes.** Th. Rosskopf. *Smit Mededelingen,* v. 7, Apr.-June 1952, p. 52-58.

Develops a formula for the most favorable ratio between translucency and welding current, from which optimum welding conditions and fluxes can be determined. Tables and graphs. (K1)

628-K. (French.) **Stitching; a New Efficient, Rapid, and Inexpensive Process.** D. Y. Gastoué. *Revue de l'Aluminium,* v. 29, May 1952, p. 196-197.

Process for joining sheet metal. Application to Al. (K13, Al)

629-K. (French.) **Argon-Arc Welding of Light Metals; Preparation for Their Welding by the Nertal Process.** Charles Guinard. *Revue de l'Aluminum,* v. 29, May 1952, p. 207-213.

Surface state, selection of welding rods, the various welding techniques, and edge preparation. Tables, graphs, macrographs, and illustrations. (K1, Al)

630-K. (French.) **Improvements in Setting of Large Diameter Rivets.** Charles Guinard. *Revue de l'Aluminum,* v. 29, June 1952, p. 249-255.

As applied to thick sheets of light metals. French and foreign methods for handling these problems. Tables and macrographs. (K13, Al, Mg)

631-K. (French.) **Repairing by Aluminothermic Welding.** P. Drumare. *Soudure et Techniques connexes,* v. 6, May-June, 1952, p. 129-137.

Repair of various objects, including coupling rods, gears, crushers, blooming-mill pinions, crankshafts, etc. Photographs and micrographs. (K6, ST)

632-K. (German.) **Synthetic Cement as Bonding Material.** P. Voigt. *Chemische Technik,* v. 4, Apr. 1952, p. 177-181.

Production, mechanical properties, and uses of a cement for metals which cannot conveniently be joined by welding, riveting, or other means. Photographs, tables, and diagrams. (K12)

633-K. (German.) **Welding in Pipeline Construction.** H. Jansen. *Erdöl und Kohle,* v. 5, June 1952, p. 350-357.

Various types of welding, such as butt welding and sleeve joint welding, in their application to pipeline construction. Thermal treatment of weldments. Includes micro and macrographs. (K general, J1, CN)

634-K. (German.) **Practical Tests on Weldability and Resistance to Weld Cracking of Steel.** W. Felix. *Schweizer Archiv für Angewandte Wissenschaft und Technik,* v. 18, May 1952, p. 152-159.

Details of weld-bend tests, the "Kinzel" test, and tear tests. Weldability tests, and tests to determine hardening and brittleness in heat-affected weld zones. Application of results. Diagrams, tables, charts, micrographs, and macrographs. (K9, ST)

635-K. (German.) **Technique of Welding and Cutting.** K. Becker. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, July 1, 1952, p. 555-558.

Welding, flame-cutting, and metal-spraying equipment. 77 ref. (K2, G22, L23)

636-K. Where Weldments Reduce Scrap Losses. Ray Zeh. *Automotive Industries,* v. 107, Aug. 1, 1952, p. 56, 80, 82.

An example of the economy sometimes achieved by weldments is shown in the double-drum cable control unit manufactured by Gar Wood Industries, Inc., for use with tractors. (K1, T4)

637-K. Select the Right Process and Material for Joining Copper and Its Alloys. Joseph Imperati. *Industry and Power,* v. 63, Aug. 1952, p. 83-87.

See abstract of "The Welding and Brazing of Copper Alloys," J. Imperati and Ira T. Hook, *Welding Journal,* item 103-K, 1952.
(K general, Cu)

638-K. Welded Design Provides Highest Efficiency. *Industry & Welding,* v. 25, Aug. 1952, p. 36-37.

Welding operations in production of portable generators for aircraft at Motor Generator Corp. (K1)

639-K. Here's How Thermit Welding Speeds Ship Repairs. *Industry & Welding,* v. 25, Aug. 1952, p. 44-45.

Picture story. (K4, ST)

640-K. Here's How to Weld Magnesium. *Industry & Welding,* v. 25, July 1952, p. 50-51, 53-54, 57; Aug. 1952, p. 46, 49-50, 66-67.

Gas and inert-arc welding of magnesium alloys. Characteristics of Mg melts, weldability, heat treatment, cleaning, corrosive fluxes, high-frequency welding, use of water-cooled torch, semi-automatic arc welding, resistance welding, brazing, and stress relief.
(K general, J general, Mg)

641-K. Brazing With Metal Powder. H. W. Greenwood. *Machinery* (London), v. 80, July 17, 1952, p. 98-99.

Procedures and brazing alloys for joining various metals, and for metal-nonmetal joining. (K8, SG-f)

642-K. Pressure Welding. R. F. Tylecote. *Metal Industry,* v. 81, July 18, 1952, p. 43-46; July 25, 1952, p. 72-73.

Theory and practice of joining metals by pressure by solid-phase welding, that is at temperatures where there is no liquid slag or low-melting point metallic constituents present to assist welding. Tables, graphs, and micrographs. 15 ref.
(K5)

643-K. Aluminum Fuel Tanks Are All-Welded. *Steel,* v. 131, July 28, 1952, p. 81-82.

Manufacture at Ryan Aeronautical Co.; no rivets are used. Over 30,000 electric spot welds join the Al alloy sheets. (K3, Al)

644-K. High Chromium Stainless as a Substitute for 18-8. Part II. Welding, Brazing, Polishing. Lester F. Spencer. *Steel Processing,* v. 38, July 1952, p. 340-343, 350.

Includes tables and photomicrographs. 11 ref.
(K general. L10, L12. SS)

645-K. Pumps and Oil-Field Tools. Parts I and II. F. R. Drahos. *Welding Engineer,* July 1952, p. 36-39; Aug. 1952, p. 40-41.

Part I: Welding operations in the manufacturing of pumps. Includes submerged-arc, inert-arc, and manual-arc processes for such materials as stainless, carbon, and cast steel, and Ni-base alloys. Application of a stainless-steel overlay. Part II: Manufacture of oil-well tools, most of which are large castings of high-hardenability and heat treatable steels. Solutions to various welding problems. (K1, L24, SS, CN, Ni)

646-K. Steel Welded by Inert-Arc Metal-Arc. *Welding Engineer,* v. 38, Aug. 1952, p. 23, 64.

Solar Aircraft Co., San Diego, Calif., has developed new techniques and applications for this process. A consumable electrode in the form of a wire of the required diameter is fed automatically to the gas-shielded arc. Advantages. (K1, ST)

647-K. Specialist in Hard Jobs. Fred M. Burt. *Welding Engineer,* v. 38, Aug. 1952, p. 29-31.

Arc and gas welding equipment and procedures of Automatic Welding Co., Inc., Los Angeles. Jobs considered include welding of SAE 4140 steel, alloy steel wire, and seamless Al tubes. (K1, K2, AY, Al)

648-K. Welding—Inside and Out. Paul A. Rodecki. *Welding Engineer,* v. 28, Aug. 1952, p. 36-37, 66.

Special considerations needed in the welding of Al storage tanks for commercial fatty acids. (K1, Al)

649-K. Diversified Welding. Howard Jackson. *Welding Engineer,* v. 38, Aug. 1952, p. 42-44, 62.

Work of Flohr & Co., metal fabricator of Seattle, Wash., whose job shop produces tailor-made items for industrial plants belonging to building construction, marine, pulp and paper, chemical food production industries, and for gasoline and oil distribution plants. Systems used include spot, arc, inert-arc metal-arc, and tungsten-arc welding.
(K1, K3, ST, SS)

650-K. New Service for Flash Welding. W. C. Henzlik. *Welding Engineer,* v. 38, Aug. 1952, p. 45-46, 48.

Unusual services of Flashweld Industries, Inc., of Franklin Park, Ill. Offered to customers are: education in flash welding, experimentation leading to product design or redesign, contract maintenance, and contract jobbing. (K3)

651-K. What Per Cent of Your Welding Electrodes Do You Use? T. Jefferson. *Welding Engineer,* v. 38, Aug. 1952, p. 51.

A graph based on results obtained from $\frac{3}{16}$-in. heavily coated electrodes 14 in. in length. (K1)

652-K. (Spanish.) **Completely Welded Ship Hull. Practical Consequences of the Results Obtained During Their Construction and Maintenance.** Erich Volbrecht. *Ciencia y Técnica de la Soldadura,* v. 2, Jan.-Feb. 1952, 10 pages.

Construction of a series of torpedo-boat hulls, and various problems involved. Includes schematic diagrams. (K1, T22, CN)

653-K. (Spanish.) **Complementary Materials in the Welding of Steel.** A. Matting. *Ciencia y Técnica de la Soldadura,* v. 1, Nov.-Dec. 1951, 10 pages.

Composition and characteristics of the most important complementary welding materials, their behavior during melting, special electrodes used in arc welding, and cracking. Includes photomicrographs. (K1, ST)

654-K. (Spanish.) **Gases and Nonmetallic Inclusions in Electric-Arc Welding.** Jose Maria Sistiaga. *Ciencia y Técnica de la Soldadura,* v. 2, Jan.-Feb. 1952, 6 pages.

Presence of porosity, the formation of nitrides and the nature and origin of some nonmetallic inclusions in welded steels. A thin iron-oxide-base electrode coating is used. Influence of these factors on mechanical properties of the weld metal. Includes photomicrographs. (K1, ST)

655-K. (Spanish.) **Present Status of Welded Construction With Light Metals.** A. Matting. *Ciencia y Técnica de la Soldadura,* v. 1, July-Aug. 1951, 11 pages.

Methods of welding Al and light alloys of different types by various processes, including results obtained in corrosion and tensile strength tests. Photomicrographs. (K general, Q27, R general, Al)

656-K. Instrumentation Minimizes the Welding Variable. J. Heuschkel. "Proceedings, First Annual Conference on Instrumentation for the Iron and Steel Industry" (Instruments Publishing Co., Pittsburgh), 1951, p. 41-48.

Variables associated with welding processes, together with instruments which measure and control the variables. Electric resistance welding, arc-welding, gas welding, brazing, thermit welding, and pre and post-welding instrumentation. Diagrams, graphs, and photographs. (K general)

657-K. Sigma Welding Stars on 3 New Jobs. Frank Harkins. *American Machinist,* v. 96, Aug. 18, 1952, p. 109-111.

Specially designed equipment at Solar Aircraft Co. for inert-gas welding. Mild and low-alloy steels, dissimilar metals (low-alloy + stainless), and stainless sections as thin as 0.050 in. are welded automatically at speeds up to 10 times those formerly obtainable. (K1, CN, AY, SS)

658-K. Automatic Welding Makes Eyebolts Faster, Better. W. H. Volkmar. *American Machinist,* v. 96, Aug. 18, 1952, p. 127.

Simple automatic submerged-arc setup yielding cost savings up to 30% over manual welding. (K1)

659-K. Good Welding Techniques Aid Repointing of Dipper Teeth. *Iron Age,* v. 170, Aug. 14, 1952, p. 137.

New techniques permit using smaller replacement tip, retaining more of original tooth. Result is saving of Mn steel. A Cu-Mo-Mn welding electrode works best. (K1, T5, AY)

660-K. Selecting the Correct Welding Process. John J. Chyle. *Machine Design,* v. 24, Aug. 1952, p. 182-185, 265-266, 268.

Systematic analysis of methods, classified under the seven most important factors involved. Tables show recommended welding processes for different materials and for different joint designs. Graph shows comparative costs. (K general)

661-K. German Report on Welding in the U. S. *Metal Progress,* v. 62, Aug. 1952, p. 146, 148, 150, 152, 154. (Condensed from "Welding Technology in the U. S. A.", H. Von Hofe, E. Kauhausen, H. Koch, K. L. Zeyen, and E. Zorn, *Schweissen und Schneiden,* v. 3, Dec. 1951, p. 359-370.)

Observations made by the German members of Tour Group 5 (Welding and Joining) during their visitations to American plants as part of the program of the first World Metallurgical Congress. (K general)

662-K. Design Properties of Brazed Joints for High-Temperature Applications. Robert L. Peaslee and Willard M. Boam. *Welding Journal,* v. 31, Aug. 1952, p. 651-662.

Brazing of stainless steel for high-temperature work with a reducing atmosphere and Ni-Cr-base alloy, using suitable procedures and equipment. (K8, SS, SG-h)

663-K. 1951 Adams Lecture: The Welding of Copper by the Inert-Gas Metal-Arc Process. John J. Chyle. *Welding Journal,* v. 31, Aug. 1952, p. 663-686.

History of discovery of Cu, outlines smelting and refining practice, mechanical properties, and other welding processes. Details of inert-gas metal-arc process. Mechanical and electrical conductivity properties and microstructures of the

welds. Pressure-vessel-fabrication procedure. 35 ref. (K1, Cu)

664-K. Production Welding 24ST3 Aluminum Using Slope Control. Robert E. Kemp. *Welding Journal,* v. 31, Aug. 1952, p. 687-691.

Some techniques and equipment developed for the successful production resistance welding of Al. Micrographs and macrographs. (K3, Al)

665-K. Resistance Welding Quality Control. Thomas J. Lepito and Robert M. Taylor. *Welding Journal,* v. 31, Aug. 1952, p. 692-698.

Quality control in jet-engine fabrication, including chemical analysis and dimensions of material, equipment, machine settings, and testing of completed welds. Experimental work was done on AMS-5510 material. Diagrams, macrographs, and micrographs. (K3, ST)

666-K. Effect of Vibration on Weld Metal. John W. Welty. *Welding Journal,* v. 31, Aug. 1952, p. 361s-366s.

Effects of vibration on microstructural solidification pattern and on mechanical properties of AISI Type 321 and 347 steel during both arc and resistance welding. Apparatus; photomicrographs illustrate typical results. (K1, K3, N12, Q general, SS)

667-K. Seam Welding of 0.005-In. Inconel Sheet. E. F. Nippes and John M. Gerken. *Welding Journal,* v. 31, Aug. 1952, p. 366s-370s.

It was found that 0.005-in. annealed Inconel could be seam welded using an electrode force of 75 lb. with a low-inertia moving electrode, a current of 1350-1425 amp., a sequence of ½ cycle "on", 4 cycles "off" with a 60 cps. supply and 40 welds per in. Special seam-welding machine with a low-inertia head. Double-seam welds were made with the second seam at the edge of one sheet. (K3, Ni)

668-K. Porosity in Mild Steel Weld Metal. Donald Warren and R. D. Stout. *Welding Journal,* v. 31, Aug. 1952, p. 381s-386s.

Reviews literature on each of the factors affecting porosity in mild-steel weld metal. 39 ref. (K9, CN)

669-K. Evaluation of the Circular-Patch Weld Test. John E. Hockett and L. O. Seaborn. *Welding Journal,* v. 31, Aug. 1952, p. 387s-392s.

Applicability of the circular-patch weld test as a means of determining weldability. The type of specimen used has high biaxial residual stresses which promote cracking. Possibility of utilizing such a test to predict probability of cracking or brittle behavior under external load, as in service. Bending four series of unnotched Unionmelt-welded mild steel patches and one set of manually welded patches at several temperatures to determine what effects welding variables had on transition temperature. 24 ref. (K9, CN)

670-K. (Book) **Welding Practice. Vol. I. Welding Methods and Tests.** R. Fuchs and H. Bradley, editors. 130 pages. 1951. Butterworth's Scientific Publications, Ltd., 4-6 Bell Yard, Temple Bar, London, 2, W.C., England. 17s 6d.

Intended to meet the practical welding needs of designers, draftsmen, engineers, and foremen. Five main subjects are: welding processes, welding metallurgy, weld examination and testing, welding equipment and shop layout, and welfare and safety in the practice of welding. Includes glossary of terms and an index. (K general)

671-K. Flash Welding of Titanium Alloys. I. A. Oehler. *Automotive Industries,* v. 107, Aug. 15, 1952, p. 39, 154, 156.

See abstract of "Titanium Alloys Flash Welded Easily," *Steel;* item 597-K, 1952. (K3, Ti)

672-K. Special Welding Equipment Used at Nash Body Plant. Joseph Geschlein. *Automotive Industries,* v. 107, Aug. 15, 1952, p. 50-53.

Welding and spray-paint equipment. (K general, L26, CN)

673-K. Preheat Temperatures for Welding Metals and Alloys. *Materials & Methods,* v. 36, Aug. 1952, p. 131.

Tabular presentation confined to the various types of steel. (K1, ST)

674-K. Ultrasonic Soldering. E. A. Neppiras. *Metal Industry,* v. 81, Aug. 8, 1952, p. 103-106.

A practical method of soft soldering Al and its alloys. Advantages and limitations. 16 ref. (K7, Al)

675-K. Secondhand Rails for New Yard. *Railway Engineering and Maintenance,* v. 48, Aug. 1952, p. 760-761.

How Central of Pennsylvania is pressure-welding second-hand rails into double or multiple lengths and sawing the latter into 78 or 75-ft. pieces. Photographs. (K2, G17, CN)

676-K. Welding in Connection With Various Tunnelling Works. E. R. Bidder. *Transactions of the Institute of Welding,* v. 15, Apr. 1952, p. 43-47.

Concerned with welding rather than tunnelling welded steel construction in relation to the type of tunnel having a circular section and a cast iron lining. (K general, CN)

677-K. Welding in the Construction of Hydro-Electric Plant. J. Crawford. *Transactions of the Institute of Weld-*

ing, v. 15, Apr. 1952, p. 48-53.
Equipment and procedures of British firm. (K general, CN)

678-K. Automatic Welding. J. Latimer. *Transactions of the Institute of Welding,* v. 15, June 1952, p. 71-82; disc., p. 82-85.
The principal types of automatic welding machines now in use, comparing their relative merits and drawbacks. Examination of certain applications to which hand welding might appear to have an advantage. Length of run, size of joint, speed of actual welding, and economy of electrodes are not the only important factors favoring more extensive use of automatic welding. (K1)

679-K. Welding of Heat-Resistant Steels. H. F. Tremlett. *Welding and Metal Fabrication,* v. 20, July 1952, p. 258-261; Aug. 1952, p. 299-303.
Various aspects of heat resistant steels as they affect the engineer. Resistance to scaling and the effect of alloying elements such as Cr, Ni, and Ti upon the scaling resistance, strength at temperature, and creep resistance. Tables and graphs.
(K general, R2, Q3, SG-h, SS)

680-K. Correlation of Weldability Tests With Structural Joints. Part II. Investigations With Unrestrained Fillet Tests and Structural Joints. C. L. M. Cottrell and M. D. Jackson. *Welding Research,* v. 6, Apr. 1952, p. 31r-42r.
Relative effects of joint rigidity and rate of cooling on initiation of hard-zone cracking were studied in an attempt to resolve the two effects, and to provide a scientific basis for correlation of weldability tests and structural joints. Effect of potential hydrogen content in the electrode coating on incidence of hard-zone cracking was also studied. Low-alloy Mn-Mo steels were used in the tests. Results are tabulated, charted, and illustrated.
(K9, AY)

681-K. Weld Hardenability of Chromium-Molybdenum Steel Pipe. *Welding Research,* v. 6, Apr. 1952, p. 43r-46r.
Metal-arc welded samples of 1% Cr, 0.5% Mo steel pipe differing in wall thickness were provided by three different firms, using various sizes of electrode and preheating temperature. The lowest hardness in the heat-affected zone was associated with the highest temperature of preheat (300° C.); and the results obtained indicate that a preheating temperature of not less than 200° C. should be used when welding these steels. (K9, J26, AY)

682-K. (Italian.) **Light-Alloy Rivets.** *Alluminio,* v. 21, June 1952, p. 291-315.
Mechanical characteristics of principal light alloys used in rivets, determination of diameter and length of the rivets as a function of thickness of the part to be riveted, types of riveting machines, distribution of rivets and their distance from edge of plate, and riveting defects. Drawings, tables, and photographs. 15 ref. (K13, T5, AI)

683-K. (Spanish.) **Completely Welded Ship Hulls. Practical Consequences of the Results Obtained During Their Construction and Maintenance. Part II.** Erich Vollbrecht. *Ciencia y Técnica de la Soldadura,* v. 2, Mar.-Apr. 1952, 9 pages.
Order and sequence of construction, as well as difficulties encountered and their solution. Correction of deformations and relief of welding stresses. (K1, T22, CN)

684-K. (Spanish.) **Four Workshop Tests for Investigating the Quality of Electrodes for Electric Welding.** Jose Izaguirre Cobo. *Ciencia y Técnica de la Soldadura,* v. 2, Mar.-Apr. 1952, 10 pages.
Operation, yield, texture, and cracking tests. (K1)

685-K. (Spanish.) **Basic Electrodes.** Salvador Ma. Checa Casajus. *Ciencia y Técnica de la Soldadura,* v. 2, Mar.-Apr. 1952, 8 pages.
Advantages and disadvantages of basic coated electrodes. Compares the mechanical and penetration characteristics of basic electrodes with other kinds of electrodes, stressing the great advantages of the former and their future possibilities. Photographs and tables. 17 ref. (K1)

686-K. (Spanish.) **Revision of the Theory of Weldability.** Felipe A. Calvo Calvo. *Ciencia y Técnica de la Soldadura,* v. 2, Mar.-Apr. 1952, 8 pages.
Discussion on the basis of theory and experiment. (K9)

687-K. Flash Welding Titanium Alloys. I. A. Oehler. *Light Metal Age,* v. 10, Aug. 1952, p. 12-13.
See abstract of "Titanium Alloys Flash Welded Easily", *Steel,* item 597-K, 1952. (K3, Ti)

688-K. Redux for Spars. *Aeroplane,* v. 83, Aug. 15, 1952, p. 216-218.
Application of Redux bonding process to composite spar-boom construction. Comparison of compression strength of riveted and Redux bonded booms. Photographs and tables. (K12, AI)

689-K. The Applicability of Fusion Welding to Pipe Fabrication. J. W. Atherton. *Australasian Engineer,* July 7, 1952, p. 54-57.

Use of metal-arc welding in piping installations where high pressures and temperatures are involved. (K1, ST, CN, AY)

690-K. New Welding Process Developed for Joining Small Aluminum Wires. P. B. Dickerson and C. R. Dixon. *Automotive Industries,* v. 107, Sept. 1, 1952, p. 50-51, 100, 102.

Welded joints are easy to make with simplified equipment, and have excellent corrosion resistance. Al was welded experimentally to brass, nichrome, chromel, alumel, W, steel, Fe, and constantan. (K6, Al, Cu, Ni, ST, Fe, W)

691-K. The Job That Needed New Welding Procedures. D. L. Rigsby and M. J. Waite. *Canadian Metals,* v. 15, Aug. 1952, p. 50, 52, 54.

A single "V" welding method used to repair a cracked cast-steel main-cylinder wall of a 4,000-ton extrusion press. (K1, CI)

692-K. High-Strength Bolts—a New Concept in Structural Connections. T. R. Higgins and E. J. Ruble. *Civil Engineering,* v. 22, Sept. 1952, p. 176-179, 255.

Pros and cons of use of bolts in preference to rivets in certain phases of metal construction. (K13)

693-K. Sequence and Continuity Mark Modern Welding Practice. R. W. Binder. *Civil Engineering,* v. 22, Sept. 1952, p. 186-191.

Practices used in the Division Street Interchange, San Francisco. (K general, CN)

694-K. California's All-Welded Viaduct Points Way to Improved Design. L. C. Hollister. *Civil Engineering,* v. 22, Sept. 1952, p. 180-185, 238. (K general, T4, CN)

695-K. Welded Machine Tools. O. Bondy. *Engineers Digest,* v. 13, Aug. 1952, p. 263-266.

By replacing heavy castings with fabricated steel of appropriate design, considerable amount of weight can be saved. Photographs show machinery of all-welded construction. 14 ref. (K general, T5, ST)

696-K. Technique for Welding Stainless Pressure Vessel. James Joseph. *Industry & Welding,* v. 25, Sept. 1952, p. 40-42, 91.

Fabrication of a high-strength pressure vessel, designed to contain 200 gal. of liquid N_2 at 5500 psi. and at −340° F. with comfortable safety tolerances. Emphasis placed on welding. Includes flame cutting, forging, and heat treatment. (K1, G22, F22, J general, SS)

697-K. Iron Powder Backup Material for Efficient Welded Joints. *Industry & Welding,* v. 25, Sept. 1952, p. 60-62, 108-109.

Previously abstracted from "Get Better Welds With Iron Powder Backup." H. Hauttman. *Iron Age,* item 413-K, 1952. (K general, H general, CN)

698-K. Canada's Largest Fractionating Tower Demonstrates Strength and Economy of Welded Construction. *Industry & Welding,* v. 25, Sept. 1952, p. 66-68, 70-72.

Fabrication from stainless-clad plate, carbon steel plate, and Type 416 stainless steel. Includes handling, heat treatment, and transportation. (K1, J general, SS, CN)

699-K. Welded Doors and Windows. Howard E. Jackson. *Industry & Welding,* v. 25, Sept. 1952, p. 74, 77-78.

Procedures at Steel Products, Inc., Seattle, arc welding, spot welding, and combination of both are used. (K1, K3, CN)

700-K. Use of Stud Welding Boosts Boiler Production 25 Percent. *Industry & Welding,* v. 25, Sept. 1952, p. 80-81. (K1, CN)

701-K. Change in Welding Procedure Speeds Fabrication of Ship Beams. Bernard Smolka. *Industry & Welding,* v. 25, Sept. 1952, p. 84-85, 93.

Results of 14 tests to secure the fastest and most efficient procedure for welding gussets into place on ship decks. (K9, CN)

702-K. More About Efficient Cable Connections (Mechanical). *Industry & Welding,* v. 25, Sept. 1952, p. 87-89.

Report on a new tool which is said to produce mechanical cable and lug connections of high electrical efficiency. Photographs show process. (K13, T1, Cu)

703-K. Explosion Transition of Weldments. *Metal Progress,* v. 62, Sept. 1952, p. 162, 164, 166, 168. (Condensed from "Investigation of Factors Which Determine the Performance of Weldments", C. E. Hartbower and W. S. Pellini, *Welding Journal).*

Previously abstracted from original. See item 621-K, 1951. (K9, Q26, ST)

704-K. Solders and Soldering. *Metal Progress,* v. 62, Sept. 1952, p. 179. (Condensed from "Solders and Soldering: Some Recent Advances", H. C. Watkins, *Metallurgia).*

Previously abstracted from original. See item 108-K, 1951. (K7)

705-K. Flash Welding Titanium. I. A. Oehler. *Modern Metals,* v. 8, Aug. 1952, p. 39.

See abstract of "Titanium Alloys Flash Welded Easily," *Steel,* item 597-K, 1952. (K3, Ti)

706-K. Engine Blocks: Sandwiched From Simple Castings. *Steel,* v. 131, Sept. 1, 1952, p. 88-89.

Complicated castings can be broken down into simple components, then furnace brazed to form the finished part. Use of the method on Al engine blocks is said to be promising. (K8, Al)

707-K. Saved: 341 Tons of Steel. I. R. A. Phelps. *Welding Engineer,* v. 37, Sept. 1952, p. 23-26.

Savings at the V. A. Hospital in Minneapolis by welding rather than riveting the steel structure. (K general, T26, CN)

708-K. Tips for Longer Tube Life. Thomas A. Dickinson. *Welding Engineer,* v. 37, Sept. 1952, p. 40-41, 46.

Factors affecting electronic tubes and possible remedies. Welding operations in their fabrication. (K general, T1)

709-K. Hot "Sandwich" of Copper and Stainless. *Welding Engineer,* v. 37, Sept. 1952, p. 42-43.

Ways in which "Rosslyn Metal" can be welded with reference to spot, seam, and arc welding. Strength at high temperature. (K3, K1, Q23, SS, Cu)

710-K. Complex Technique Used for Stainless Nacelle Production. *Western Metals,* v. 10, Aug. 1952, p. 37.

Use of AISI Type 301 stainless steel in production of aircraft nacelles at Solar Aircraft Co., San Diego. Almost 20,000 individual spotwelds are required per unit. (K3, SS)

711-K. (German.) **Calculation and Construction of Welded Structures. Influence of Size and Strength in Resistance Spot Welding.** W. Glage. *Schweissen und Schneiden,* v. 4, Aug. 1952, p. 292-297.

Proposes a method of calculation on the basis of data from the literature. Examples. Data are tabulated and charted. (K3, CN)

712-K. (German.) **Production of a Motor Housing by Means of Welded Construction.** Raimund Pertusini. *Schweisstechnik,* v. 6, July 1952, p. 73-75.

Advantages of welded parts over cast parts. Details of construction are diagrammed. (K general, CN)

713-K. (Japanese.) **Welding Mechanism of Resistance Welding and Determination of Welding Procedures.** Zenzaburo Sawai. *Report of the Institute of Industrial Science, University of Tokyo,* v. 1, no. 7, Mar. 1951, p. 208-238.

Electrical, thermal, and mechanical problems of resistance welding, such as heating due to contact resistance, effect of mechanical pressure, and cooling by surrounding metals and electrodes, are discussed from an experimental and theoretical standpoint. A method of determining welding procedure. Slope control of welding current is very effective in some cases. Graphs and diagrams. 25 ref. (K3)

714-K. Electric Arc Welding of Magnesium Alloys. K. K. Khrenoff, M. N. Gapchenko, and G. P. Sakhatzky. *Aircraft Engineering,* v. 24, Sept. 1952, p. 277-278. (Translated from *Avtogennoe Delo,* Aug. 1951, p. 1-5.)

Tests on the carbon-arc welding of corrosion resisting Mg alloy. Recommended practice covers use of fluxes, welding procedures and welding conditions, and preparation and positioning of components. Tables. (K1, Mg)

715-K. Production-Line Soldering and Brazing. C. E. Eadon-Clarke. *Electrical Communication,* v. 29, Sept. 1952, p. 179-185.

See abstract of "Push-Button" Soldering and Brazing; *Welding and Metal Fabrication;* item 451-K, 1951. (K7, K8)

716-K. Ethoxyline Resins as Cast Resins and Bonding Agents for Metals. Karl Frey. 4th International Mechanical Engineering Congress, June 1952, 13 pages.

Examples illustrate the manifold technical possibilities of adopting these resins. Tabulated properties. (K12)

717-K. (French.) **Study Using the Crossed-Gradient Method of the Behavior of Steel During Welding.** Henri Granjon. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 235, July 16, 1952, p. 173-175.

Method of studying general metallographic problems when it is necessary to associate three variables: duration of heating, maximum temperature, and rate of cooling. (K9, M23, ST)

718-K. (French and German.) **Experiences With Brazed Joints.** Edw. Demuth, Jr. *Zeitschrift für Schweisstechnik; Journal de la Soudure,* v. 42, Aug. 1952, p. 155-160.

Construction details of the application of Cu fittings to water, gas, and oil ducts. Photographs. (K8, Cu)

719-K. (Book.) **Structural Theory and Design. Vol. II.** J. McHardy Young.

310 pages. 1951. Crosby Lockwood & Son Ltd., 39 Thurloe Street, London S.W. 7, England. $4.00.

Advanced theory and design suitable for the specializing student and for the practicing structural engineer. Various structures; foundations; earth pressures, etc.; and structural connections including riveted, bolted, and welded, for steelwork. Photographs, diagrams, tables, and chapter bibliographies and exercises.
(K general, T26, ST)

720-K. (Pamphlet.) **Welding, Joining and Cutting of Gray Iron.** C. O. Burgess. 1951. 37 pages. *Gray Iron Founder's Society,* 210 National City-E. 6th Bldg., Cleveland 14, Ohio. $1.50.

New processes and techniques; how the advantages of welded fabrication can be extended to gray-iron components. Engineering considerations in using welding processes. General considerations in welding gray iron, arc welding processes, brazing, special joining processes, and torch and arc cutting.
(K general, G22, CI)

721-K. Tractor Forgings Joined by Welding. Stephan Chmielewski. *Machinery* (American), v. 59, Sept. 1952, p. 190-191.

Welding of track roller halves by a 500 kva. butt-welder, and a track guide frame by manual arc welding. (K1)

722-K. Welded Frames Span 328'. *Architectural Forum,* v. 97, Sept. 1952, p. 158.

Mexico City's huge auditorium roof is supported by eight 260-ton 2-hinged rigid skipwelded frames whose tonnage was reduced 50% by welding. (K1, T26, ST)

723-K. Pressure Welding Makes Noiseless Track. *Canadian Metals,* v. 15, Sept. 1952, p. 54, 56.

Application in joining sections of railroad track. (K2, CN)

724-K. Welding and Welded Connections. W. Gerritsen. *Engineer,* v. 194, Sept. 19, 1952, p. 394-395. (A condensation.)

Principles and theory behind welding to produce more satisfactory designs. (K general)

725-K. Brazing Offers Economy in Making Aluminum Castings. William G. Gude. *Foundry,* v. 80, Oct. 1952, p. 124-125.

Method in which several simple Al castings are made and then brazed together to form the desired product. (K8, E general, Al)

726-K. Variations in Techniques for Welding Magnesium. Frank Charity. *Industry & Welding,* v. 24, Oct. 1952, p. 48-50, 53.

Inert-gas, arc welding, and resistance welding. Preparation and safety precautions, techniques, procedure for fillet welds, cleaning after welding, and inspection of welds.
(K1, K3, S13, Mg)

727-K. How to Improve Welding Production. Edmund Jacobson. *Industry & Welding,* v. 25, Oct. 1952, p. 60-62, 65-66, 146-147.

Proper cleaning of weldments before, during, and after manufacturing increases production and quality.
(K general, L12, CI)

728-K. How Plastic Tooling Aids Welding. Gilbert C. Close. *Industry & Welding,* v. 25, Oct. 1952, p. 68-69.

Use of plastics for welding jigs and check fixtures for welded components. (K general)

729-K. How To Spot Weld Aluminum to Air Force Specifications. H. J. Jacobson. *Industry & Welding,* v. 25, Oct. 1952, p. 70-72, 75, 150-151.

Efficient cleaning procedure and steps in running qualification tests.
(K3, Al)

730-K. A Report on Weldability of 8½% Nickel Steel. *Industry & Welding,* v. 25, Oct. 1952, p. 105-106.

Tests were run. Rods used were 25-20 Cr-Ni stainless steel and 80% Ni-Cr alloy. Butt welds were used. Results tabulated.
(K9, Ni, AY, SS)

731-K. It's Easy to Weld Stainless Steel. Howard E. Jackson. *Industry & Welding,* v. 25, Oct. 1952, p. 55-59, 130-131.

Processes of Rossoe Mfg. Co., of Seattle, for welding stainless steel oil-burning furnaces. Use of spot welding, two-wheel cart jig, and correct rod. Stages of welding and testing. (K3, K1, SS)

732-K. Automation Speeds Fuel Tank Assembly and Test. Herbert Chase. *Iron Age,* v. 170, Sept. 25, 1952, p. 122-124.

Procedures at Rouge plant, Ford Motor Co. Assembly operation is flexible enough to permit fabrication of different types of tanks on same line with only minor adjustments in procedure. Major joints are seam welded two sides at a time.
(K general)

733-K. Submerged Arc Welding. O. M. Fromm. *Iron and Steel Engineer,* v. 29, Sept. 1952, p. 100-106.

The semi-automatic submerged-arc welding process as used in conjunction with jigs and positioners.
(K1, ST)

734-K. Flash Welding Titanium Alloys. I. A. Oehler. *Materials & Methods,* v. 36, Sept. 1952, p. 206, 208, 210.

See abstract of "Titanium Alloys

Flash Welded Easily", *Steel,* item 597-K, 1952. (K3, Ti)

735-K. Survey of Modern Theory on Welding and Weldability. (Concluded.) D. Seferian. *Sheet Metal Industries,* v. 29, Sept. 1952, p. 827-832, 840.

Electrodes—their manufacture by extrusion and dipping; operational characteristics; faults in coated electrodes; and classification. Selection of materials from which to manufacture electrodes, and effect of composition on the weld. Tables and photographs. (K9, T5)

736-K. Welded Girders Part of Huge Bridge Cranes. *Steel,* v. 131, Sept. 29, 1952, p. 86.

Girders for the two 350-ton bridge cranes under construction for McNary dam were fabricated largely by continuous seam welding at Willamette Iron & Steel Co., Portland, Ore. (K1, T26, ST)

737-K. Heavy Construction at Thorncliffe. *Welding and Metal Fabrication,* v. 20, Sept. 1952, p. 310-315.

Welding procedures at Newton Chambers Co., England, for construction of heavy engineering equipment. (K general, ST)

738-K. Pressure Vessel Conversion. J. K. Johannesen. *Welding and Metal Fabrication,* v. 20, Sept. 1952, p. 321-324.

Diagrams and table show how a used pressure vessel was converted for a new application. Butt welding was used for joining. (K1, ST)

739-K. Storage of Arc Welding Electrodes. *Welding and Metal Fabrication,* v. 20, Sept. 1952, p. 325.

Advantages of correct storage; heated and unheated dry-storage. (K1)

740-K. Industrial Brazing. Part I and II. E. V. Beatson and H. R. Brooker. *Welding and Metal Fabrication,* v. 20, Aug. 1952, p. 293-298; Sept. 1952, p. 335-340.

Recommended procedures and applications, with emphasis on Cu brazing of ferrous metals. Part II: Furnace brazing with various alloys. Precautions for base metals of Cu and stainless steel. (K8, ST, Cu, SG-f)

741-K. Production Brazing. J. Raymond Wirt. *Welding Journal,* v. 31, Sept. 1952, p. 759-764.

Production brazing processes, brazing filler metals, and some specific application of furnace brazing and induction brazing. Wide variety of metals and alloys mentioned. Table and photographs. (K8, SG-f)

742-K. Observations on Experience With Welded Ships. David P. Brown. *Welding Journal,* v. 31, Sept. 1952, p. 765-782.

Background of experience acquired with welded construction in shipyards of the United States prior to war construction program, experience during program, and lessons learned from that experience. (K general, T22, ST)

743-K. The Arc Welding of Low Chromium-Molybdenum Steel Pipe. J. Bland, L. J. Privoznik, and F. J. Winsor. *Welding Journal,* v. 31, Sept. 1952, p. 783-790.

Comparison of low-hydrogen and cellulose-coated electrodes in welding two types of Cr-Mo steel pipe. Composition of weld metal and mechanical properties of the welds. Heat treatment in relation to stress relief. Tables and graphs. 10 ref. (K1, Q general, J1, AY)

744-K. Maintenance of Resistance Welders in High-Speed Assembly Lines. James F. Salatin and O. D. Etchison. *Welding Journal,* v. 31, Sept. 1952, p. 799-808.

Assembly of small electrical parts at high rates of speed involved a determination of the best method of accomplishing the job including equipment, determination of tolerances, provision for changing electrodes, electrical considerations, timers, and maintenance. (K3)

745-K. Welding Simplifies Drilling Mast Construction. Charles O. Planting. *Welding Journal,* v. 31, Sept. 1952, p. 810-813.

Use of welded construction by International Derrick and Equipment Co., Torrance, Calif. A low-alloy high-tensile steel is used. (K general, T28, AY)

746-K. All-Welded Steel Gondolas Built on Assembly Line. Howard B. Martin and Michael J. Zevada. *Welding Journal,* v. 31, Sept. 1952, p. 814-819.

Each car, built at Pullman-Standard Car Mfg. Co., Butler, Pa., requires a total of approximately 2600 lineal ft. of welding, including both manual shielded-arc and automatic hidden-arc machine welding. (K1, T23, ST)

747-K. Should Preheat be Substituted for High-Temperature Stress Relief in the Codes? E. Paul DeGarmo. *Welding Journal,* v. 31, Sept. 1952, p. 393s-396s.

Results of seven independent investigations show that 400° F. preheat is just as effective as 1200° F. stress-relief heat treatment in improving performance of low-carbon steel weldments, welded with AWS Type E6010 electrodes, for static and impact load conditions. Preliminary studies with small specimens of plain carbon steel indicate that preheat may not be quite as effective

as stress relieving in case of fatigue. Tables and graphs.
(K9, K1, J1, ST, CN)

748-K. The Strength and Ductility of Welds in Aluminum Alloy Plate. F. G. Nelson, Jr. and F. M. Howell. *Welding Journal,* v. 31, Sept. 1952, p. 397s-402s.

Data accumulated over a period of several years on plate welded by the argon-shielded tungsten-arc method and semi-automatic and automatic argon-shielded consumable-electrode methods. The data consist of tensile strength and free-bend elongation of butt welds and shear strength of longitudinal and transverse fillet welds. Tables and graphs.
(K9, K1, Q23, Al)

749-K. Stresses in Circular-Patch Weld-Test Specimens. Alan V. Levy and Harry E. Kennedy. *Welding Journal,* v. 31, Sept. 1952, p. 402s-405s.

An investigation of the residual stresses in specimens of various plate and patch sizes using a hot rolled mild-steel plate as specimen source. Graphs and diagrams.
(K9, Q25, ST)

750-K. Porosity in Mild Steel Weld Metal. Donald Warren and R. D. Stout. *Welding Journal,* v. 31, Sept. 1952, p. 406s-420s.

Among the factors investigated are: current density; travel speeds; carbon-oxygen reaction; electrode type; base plate deoxidation; ferromanganese additions; arc atmosphere; oxygen additions; oxide scale; cooling rate or base plate thickness; and multipass welds. The shielded inert-gas metallic arc process was used. Tables and photographs.
(K1, ST)

751-K. Continuous Cooling Transformation of Weld Heat-Affected Zones. W. R. Apblett, L. K. Poole, and W. S. Pellini. *Welding Journal,* v. 31, Sept. 1952, p. 421s-430s.

A novel method for studying continuous cooling transformations that occur in the heat-affected zone of weldments. Significance of mode and type of transformation. TTT diagrams for Mn high-tensile steel (Navy Specification 48S5g). Three different types of transformation were noted. Photomicrographs, photographs, and graphs.
(K9, N8, AY)

752-K. Chromium Recovery During Submerged-Arc Welding. James G. Kerr and David A. Elmer. *Welding Journal,* v. 31, Sept. 1952, p. 431s-438s.

Reactions in submerged-arc welding of stainless steel depend on flux composition and welding conditions. Best fluxes are low in Mn and Si and high in basic compounds. Photographs, tables, and graphs. 15 ref.
(K1, SS)

753-K. The New Brown Boveri Welding Set. H. Kocher. *Brown Boveri Review,* v. 39, Apr. 1952, p. 128-134.

Excellent welding results, high efficiency, and extraordinary great mobility due to the light weight are claimed for a new patented design. The welding current can be infinitely regulated over a range of 1:10 without changing connections at the terminals, and remote position regulation can be provided if desired. Several sets can be operated in parallel without special arrangements. Tables, graphs, and illustrations.
(K3)

754-K. Combinable Electronic Controls for Air-Operated Heavy-Duty Spot Welding Machines. E. Gut. *Brown Boveri Review,* v. 39, Apr. 1952, p. 135-140.

A synchronous precision electronic control with various modified forms for practically all kinds of spot welding work. Diagram, table, and illustrations. (K3)

755-K. A Simple Electronic Weld Timer for Spot Welding Machines. G. Gerspacher. *Brown Boveri Review,* v. 39, Apr. 1952, p. 140-142.

Diagrams and illustrations. (K3)

756-K. A High-Conductivity Glass-To-Metal Seal. J. C. Turnbull. *RCA Review,* v. 13, Sept. 1952, p. 291-299.

Properties of high-conductivity seals using Kovar plated with Cu and Cr. Technique developed to reduce seal heating at high frequencies. Photomicrographs, tables, and diagrams. (K11, P15, Fe, Cu, Cr)

757-K. How to Pick the Right Welding Process. John J. Chyle. *SAE Journal,* v. 60, Oct. 1952, p. 30-38. (Excerpts from "Factors in the Selection of Welding Processes", John J. Chyle.)

Previously abstracted from *Machine Design.* See item 660-K, 1952.
(K general)

758-K. Bronze Welding. A Review of Its History, Principles, Practice, and Applications. T. J. Palmer. *Sheet Metal Industries,* v. 29, Oct. 1952, p. 917-923.

(K8, Cu)

759-K. A Shipyard Re-Organization for Welded Pre-Fabricated Construction. Clement Stephenson. *Transactions of the Institute of Welding,* v. 15, Aug. 1952, p. 101-111.

Layout reorganization at William Doxford & Sons, Ltd. Welding details and inspection. Diagrams and photographs. (K general, T26, ST)

760-K. Light Weight Welded Construction in Mechanical Engineering

Structures. F. Koenigsberger. *Transactions of the Institute of Welding,* v. 15, Aug. 1952, p. 113-123.

Theoretical basis and practical approach. (K general, T26, ST)

761-K. Fabrication of Aircraft Undercarriages. *Welding and Metal Fabrication,* v. 20, July 1952, p. 242-245.

Use of oxy-acetylene pressure welding in the manufacture of aircraft landing gear at Monasco Mfg. Co., Burbank, Calif. In general, Cr-Mo and Ni-Cr-Mo low-alloy steels are used. (To be concluded.) (K2, AY)

762-K. How to Weld Stainless Steels. Lester F. Spencer. *Welding Engineer,* v. 37, Oct. 1952, p. 45-53.

Manual-arc, automatic-arc, inert-gas, gas, and atomic-hydrogen welding methods. Chrome-nickel and straight-chromium steels are dealt with. Corrosion resistance is mentioned and structure shown. Tables, diagrams, photographs, and micrographs. 12 ref. (K1, K2, SS)

763-K. Brazing of Stainless Steels. *Welding Engineer,* v. 37, Oct. 1952, p. 54.

Silver brazing techniques. (K8. SS)

764-K. Resistance Welding of Stainless Steels. Lester F. Spencer. *Welding Engineer,* v. 37, Oct. 1952, p. 55-59.

Welding procedures for austenitic stainless steel by spot, pulsation, projection, seam and roll-spot, and flash welding for butt joints. Tensile strengths and microstructure. Diagrams, photographs, tables, and micrographs. (K3, M27, Q27, SS)

765-K. Electrode Comparison Chart for Stainless-Steel Electrodes. *Welding Engineer,* v. 37, Oct. 1952, p. 73-75. (K1, SS)

766-K. Correlation of Weldability Tests With Structural Joints. Part III. Investigations With the Controlled Thermal Severity Test. C. L. M. Cottrell, M. D. Jackson, and J. G. Purchas. *Welding Research,* v. 6, June 1952, p. 50r-57r.

New weldability test for low-alloy steel is used to determine relative liability to hard-zone crack formation when any low-alloy steel is welded with any metal-arc welding electrode and to determine welding procedure which will give crack-free hard zones in a structural joint. General equation for calculating cooling rate is proposed and critical cooling rates are derived for a number of different types of electrode used for welding a low-alloy steel. Weldability index proposed for classifying low-alloy steels referring to hard-zone cracking. (K9, AY)

767-K. Some Suggested Causes of Porosity and Hot-Cracking in the Metal-Arc Welding of Plain Carbon Steels. Arne Apold. *Welding Research,* v. 6, June 1952, p. 58r-66r. (Reprinted from *Sveiseteknikk,* Dec. 1950).

Reactions between slag and steel in terms of tendencies to approach chemical equilibrium. Typical cases of surface porosity. New theories of porosity. Influence of welding procedure factors and slag properties on porosity. Dependence of hot cracks on welding conditions. Influence of chemical elements on freedom of welds from hot cracking. Theories on causation of hot cracking. Experimental data. Photographs and tables. 29 ref. (K9, CN)

768-K. (Book.) **Automobile Body Reconditioning.** Theo. A. Wohlfeil, Erik E. Frisk, and A. B. Saxman. 157 pages. McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y. $3.60.

Purpose is to serve as a text, reference manual, or handbook in automobile body reconditioning. Oxy-acetylene welding and sheet-metal straightening. (K2, G general)

769-K. (Book.) **Jefferson's Gas Welding Manual.** T. B. Jefferson. 112 pages. 1952. Associated Business Counselors, Skokie, Ill. $2.00.

Written for the reader who knows how to weld, and designed to fill gaps in his knowledge of various metals and processes. Beginners also can learn how to do simple gas welding and flame cutting. "Jiffy Welding Guides" are 20 separate sections of basic facts for joining any metal that is weldable by the oxy-acetylene process; the flame cutting of various metals covered in a similar series of guides; process selection, tip comparison charts. (K2, G22)

770-K. (Book.) **Welding and Riveting Larger Aluminium Structures.** P. L. Teed. 223 pages. 1952. Aluminium Development Association, 33 Grosvenor Street, W 1, London.

Contains four papers presented at the Aluminium Development Association symposium on welding and riveting of Al alloys, Nov. 1951. P. T. Houldcroft, W. G. Hull, and H. G. Taylor review current processes of arc welding in relation to certain specified aluminum alloys. J. R. Handforth deals with argon-arc process. J. C. Bailey reviews properties and driving of large Al alloy rivets, and S. C. Redshaw discusses design of riveted joints. (K general, Al)

771-K. (Book.) **Die Schweisstechnik des Bauingenieurs.** (Welding for Structural Engineers). **Ed. 2.** Bernhard Sahling and Kurt Latzin. 278 pages. 1952. Fried. Vieweg & Sohn, Braun-

schweig, Germany.

Practical introduction to planning, designing, producing, and testing welded joints in structural steel with special reference to official specifications. Weldable steels, the welding processes, shrinkage stresses and types of joints, and present methods of designing and producing plate girders, arches, pre-stressed concrete structures and tubular structures. Fabricating shop methods, welding in reinforced concrete construction, oxygen cutting, magnaflux and radiography, and important foreign welded bridges and buildings. (K general, T26, S22, ST)

772-K. Submerged Arc Welding at Atlas Steels, Ltd. Carl Edwall. *Iron and Steel Engineer,* v. 29, Oct. 1952, p. 55-60.

Correlates characteristics of the process with its advantages. Cost data for several repair jobs on cast steel and forged steel equipment. (K1, CI, CN)

773-K. Welding of Metals Important to the Petroleum Industry. H. G. Geerlings and C. Vollers. *Third World Petroleum Congress, Proceedings,* sec. VIII, 1951, p. 15-31; disc., p. 43-49.

After a definition of the concept, weldability of various metals is evaluated. Test for determining this property for thin sheet metal. Factors which limit welding of Cr-Mo steels. Use of austenitic electrodes, determination of dilution of weld metal with base metal, and structural changes at high temperatures. Problems connected with welding of nonferrous metals, with special attention to hard facing. Mechanical properties, TTT-diagrams for a Cr-Mo steel, and constitution diagram for transition zone in stainless steel. (K9, N8, Q general, L24)

774-K. Industrial Brazing; Resistance Brazing. E. V. Beatson and H. R. Brooker. *Welding and Metal Fabrication,* v. 20, Oct. 1952, p. 370-376.

Various methods and materials used in the process. Photographs and tables. (K8, Cu)

775-K. Technical Aspects of Soldering Practices. Robert M. MacIntosh. *Welding Journal,* v. 31, Oct. 1952, p. 881-897.

Various processes and materials involved are presented in a logical classification and discussed separately. Fundamental properties of solder alloys and methods of applying them efficiently at modern production speeds. Tables, photographs, and diagrams. (K7, SG-f)

776-K. New Rules for Welding Low-Alloy Ferritic Pipe Material. Charles F. Perry. *Welding Journal,* v. 31, Oct. 1952, p. 898-902.

Historical background of new rules for high-pressure, high-temperature marine piping and their principal provisions. Graphs, diagrams, and tables. (K1, S22, AY)

777-K. High-Strength Vacuum Brazing of Clad Steels. R. C. Bertossa. *Welding Journal,* v. 31, Oct. 1952, p. 441s-447s.

Development of high-strength brazed joints having a uniform and continuous bonding over large areas without use of fluxes or special furnace atmospheres. Continuous brazed bonds were produced between low and medium-carbon steels and the major types of stainless steel. (K8, CN, SS)

778-K. Weld Cracking of Aluminum Alloys. J. D. Dowd. *Welding Journal,* v. 31, Oct. 1952, p. 448s-456s.

Simple test developed for quantitative evaluation of crack sensitivity of welds in Al alloys. Results are given for several heat treatable and nonheat treatable Al alloys. Tables and graphs. (K9, Al)

779-K. Basic Flame Studies and Their Relationship to Welding Equipment. James A. Browning and Merle L. Thorpe. *Welding Journal,* v. 31, Oct. 1952, p. 465s-468s.

Study of factors affecting stability of propane flames and relationship of these factors to welding and heating equipment. Diagrams and graphs. (K2)

780-K. Spot Welding of Titanium Alloy Sheet. M. L. Begeman, E. H. Block, Jr., and Frank W. McBee, Jr. *Welding Journal,* v. 31, Oct. 1952, p. 469s-474s.

Specific welding equipment, correct machine settings, and adequate preparation of surface conditions for spot welding of Ti alloys. Diagrams, graphs, and photomicrographs. (K3, Ti)

781-K. (German.) **Welding Tests on Steel Showing an Increased Yield Point Due to Submicroscopic Inclusions.** Karl August Krekeler. *Stahl und Eisen,* v. 72, Oct. 9, 1952, p. 1278-1280; disc., p. 1280-1285.

Compares properties of welded specimens of St 50 with low-alloy structural steels and St 53. Includes fatigue-test data in tables and charts. 24 ref. (K general, Q23, Q7, CN)

782-K. (Russian.) **Cementing Metals Using Carbinol Glues and the Inhibiting Action of Some of Them on the Initiation of Polymerization.** A. Ia. Korolev, I. V. Stepanova and S. B. Isakova. *Doklady Akademii Nauk*

SSSR, new ser., v. 85, July 11, 1952, p. 331-333.

It was found that Pb and Cu alloys strongly inhibit the setting of carbinol glues, while steel, Zn, Cr, and other metals have no effect. Data are tabulated. (K12)

783-K. Automatic Welding Spurs Auto Frame Production. H. G. Schultz. *Iron Age*, v. 170, Oct. 30, 1952, p. 84-87.

System in which all operations, including welding, clamping, feeding welding wire and flux, tracing, and slag removal are fully automatic. Photographs and diagrams. (K1, CN)

784-K. Ductile Welding of Zirconium. F. G. Cox. *Murex Limited Review*, v. 1, no. 11, 1952, p. 245-261.

Equipment, mechanical and corrosion properties, and microstructure of the welds. Photographs, micrographs, tables, and graphs. (K1, Zr)

785-K. Brazing of Stainless Plating as an Aid in the Brazing of Stainless Steel. A. Korbelak and E. C. Okress. *Plating*, v. 39, Nov. 1952, p. 1220-1222, 1228.

Use of Ni electrodeposits to facilitate manufacture of large-sized intricate designs of stainless steel. A tabular summary illustrated with photomicrographs outlines use of varying thicknesses of plated coatings for different brazing temperatures. (K8, L17, SS)

786-K. Finishes for Soft Soldering. E. E. Halls. *Product Finishing*, v. 5, Oct. 1952, p. 68-79.

Finishes for metals to be soldered include hot dip coatings of Sn or solder; electroplated coatings of Cd, Sn, Ag, Pb, Sn-Pb alloy and Sn-Zn alloy; fused electroplated coatings of Sn or Pb-Sn alloy; or a combination of electroplated and hot-dip solder. Tables and diagrams. (K7, L16, L17)

787-K. These Fillet Welds Were 106 Ft. Long. Ralph H. Kipp. *Welding Engineer*, v. 37, Nov. 1952, p. 28-30.

Welding of an I-beam 53 in. deep and 106 ft. long at Judson-Pacific-Murphy Corp., Oakland, Calif. Gamma-ray inspection used. (K1, S13, CN)

788-K. How We Cured Porosity in Squirt Welding. Don W. Whiteside. *Welding Engineer*, v. 37, Nov. 1952, p. 38-39, 52.

Analysis of causes directly or indirectly responsible for porosity, which included impure flux, arc voltage too high, and arc blow. Recommended solutions. (K1)

789-K. Welding Costs Cut to ⅓. Merrill F. Yale. *Welding Engineer*, v. 37, Nov. 1952, p. 40-41.

Welding steps in fabrication of mild steel cylindrical tanks for outdoor high-voltage circuit breakers. Semi-automatic submerged-arc welding was used. (K1, CN)

790-K. It's Metal Cloth—and It's Welded. W. C. Henzlik. *Welding Engineer*, v. 37, Nov. 1952, p. 42-43.

Uses for metal cloth in strainers of high and low brass bronze, monel, stainless steel, Inconel, Nichrome, Chromel and new alloys. Equipment used for spot and seam welding and the search for a satisfactory wheel alloy. (K3, Cu, Ni, Cr, SS)

791-K. If It Goes "Pop," It's Okay. Howard E. Jackson. *Welding Engineer*, v. 37, Nov. 1952, p. 48-50, 52.

Construction of parts in a freezer, emphasizing pressure-tight welding and brazing. CO_2 gas was used for testing. Use of Cu tubing and stainless steel dashers in fabrication. (K general, T29, Cu, SS, CN)

792-K. (French.) Influence of Torch and Arc Welding on the Properties of Aluminum and Its Alloys. E. Zurbrugg. *Aluminium Suisse*, v. 2, Sept. 1952, p. 156-163.

Speed of welding, flux removal, atmosphere, effect of heat on Al alloys, and hardness and corrosion resistance of alloys after welding. Charts and photographs. (K1, K2, Q29, R general, Al)

793-K. Pressure Chamber Withstands 17,600 Psi. *Iron Age*, v. 170, Nov. 13, 1952, p. 158-159.

Construction of pressure chamber from SAE-4130 alloy. Care taken in welding parts together to avoid flaws. Stress relief and inspection. (K1, J1, AY)

794-K. Designing With Plug Welds. Omer Blodgett. *Machine Design*, v. 24, Nov. 1952, p. 152-153.

Advantages. Diagrams. (K general)

795-K. Metal Arc Welding of Stainless Steel. Part I. Jigging to Weld. E. M. Rains. *Sheet Metal Worker*, v. 44, Nov. 1952, p. 44-45.

Recommended procedures. (K1, SS)

796-K. Welding of Stainless Steels. G. G. M. Carr-Harris. *Technical Information Service, National Research Council* (Canada). Report 11, Oct. 1950, 5 pages.

Alloy identification, welding methods, and metallurgical aspects. 18 ref. (K general, SS)

797-K. Considerations in Decreasing Electrode Pick-Up in the Spot Welding of Aluminum Sheet. W. P. Campbell and G. G. M. Carr-Harris. *Technical Information Service, National*

Research Council (Canada), Report 15, Oct. 1950, 6 pages.

Pre-weld cleaning of Al sheet, electrode material, and electrode maintenance. (K3, L12, Al)

798-K. Welding of Zinc Alloy Die Castings. G. G. M. Carr-Harris. *Technical Information Service, National Research Council,* (Canada), Report 16, Nov. 1950, 8 pages.

(K general, Zn)

799-K. Welding of Molybdenum. W. H. Kearns, H. B. Goodwin, D. C. Martin, and C. B. Voldrich. *U. S. Atomic Energy Commission,* BMI-703, Sept. 1, 1951. 36 pages.

Material, welding procedures, and test methods used. Results of tests made with high-purity Mo produced by vacuum fusion, and on commercial Mo. (K general, Mo)

800-K. Distortion Control in Structural Fabrication. Gordon Cape and Llewellyn Jehu. *Welding Journal,* v. 31, Nov. 1952, p. 1009-1016.

Practical methods employed to control distortion of welded products in a large Canadian steel fabricating plant. Reviews some of the fundamental aspects associated with welding, difficulties which have arisen, and methods employed in control of welded work.

(K general, T26, CN)

801-K. Joint Design for Brazing. W. J. Van Natten. *Welding Journal,* v. 31, Nov. 1952, p. 1023-1028.

Selection of ferrous and nonferrous base metals; filler metals; types of joints; service requirements with regard to mechanical strength, electrical conductivity, pressure tightness, and elevated and subzero service temperatures. Extensive diagrams. (K8)

802-K. Increased Multispot Production With Limited Power Supply. C. R. Whitney, Jr. *Welding Journal,* v. 31, Nov. 1952, p. 1029-1034.

Development and design of a new multispot control which provides increased welding production despite limited power supply, by reducing transients and by sequence firing of transformers in small groups. Photographs and diagrams. (K3)

803-K. Forming and Welding of Titanium. Francis H. Stevenson. *Welding Journal,* v. 31, Nov. 1952, p. 1035-1041.

Strength tests of and tabulated information on spot welding and inert-gas tungsten-arc butt welding. Photographs and tables.

(K1, K3, G general, Q23, Ti)

804-K. Strength Joints to Steel With Aluminum Bronze Filler Metals. Willis G. Groth and Robert E. Maersch. *Welding Journal,* v. 31, Nov. 1952, p. 1043-1048.

Brazing and welding concepts, tensile and hardness tests on mild steel, brazed joint test specimens, fusion-zone and test requirements, effects of heat treatment, welding procedure, and supplementary data using other steels and test specimens. Photographs, diagrams, micrographs, and tables.

(K8, Q general, CN, ST)

805-K. A New Welded Railway Bridge in Switzerland. M. Frei. *Welding Journal,* v. 31, Nov. 1952, p. 1052-1054. (Translated and condensed from *lOssature Metallique,* v. 17, May 1952, p. 249-255.

Diagrams and illustrates construction. Two types of Al-killed, basic bessemer, low-carbon steel were used. (K1, T25, CN)

806-K. Back to Work Because of Braze Welding. R. L. Fuller. *Welding Journal,* v. 31, Nov. 1952, p. 1057-1058.

Photographic treatment of restoration of broken and obsolete machinery by braze welding with an oxyacetylene welding blowpipe. (K8)

807-K. Tow Carts Fabricated by Inert-Gas Metal-Arc Welding. *Welding Journal,* v. 31, Nov. 1952, p. 1059.

Construction of stainless steel carts by use of automatic butt seams, and a light-weight Heliarc torch. (K1, SS)

808-K. (German.) **Electric Resistance Flash Welding of Railway Rails.** Reinhold Kühnel. *Stahl und Eisen,* v. 72, Oct. 23, 1952, p. 1346-1349.

Effects of chemical composition and differences in dimensions of rails on welded joint quality. Specifications for preparation and selection of rail ends to be welded, plus difficulties encountered in control of welding process. Explains making of welds and treatment of joints after welding. (K3, CN)

809-K. (Book.) **Das Elektrische Widerstandsschweissen.** (Electric Resistance Welding). Walter Brunst. 290 pages. 1952. Springer-Verlag, Berlin, Germany.

Principles, procedure, and welding equipment, and recent research. Illustrations, graphs, and tables. 123 ref. (K3)

SECTION L

CLEANING, COATING and FINISHING

1-L. Ceramic-Coated Exhaust-Systems. Wilson G. Hubbell. *Aircraft Production,* v. 13, Nov. 1951, p. 357-362.

See abstract of "Ceramic Coatings for the Hot Spots," *Finish,* item 781-L, 1951. (L27)

2-L. How to Clean Stainless Steel. *American Machinist,* v. 95, Nov. 12, 1951, p. 173.

Recommended mechanical and chemical procedures. (L10, L12, SS)

3-L. Symposium on Conservation of Pickle Room Materials. Lewis C. Farrow, J. J. Baker, and M. H. Whitehead. *Better Enameling,* v. 22, Nov. 1951, p. 6-10.

Introduction and summary of panel discussion is by Mr. Farrow. Separate statements by Mr. Baker and Mr. Whitehead. (L12)

4-L. Government Specifications for Porcelain Enamels. W. N. Harrison. *Better Enameling,* v. 22, Nov. 1951, p. 32-36.

(L27, S22)

5-L. Enameling of Aluminum. C. R. Sigler. *Better Enameling,* v. 22, Nov. 1951, p. 11-12, 22-23, 29-30.

Previously abstracted from *Ceramic Age.* See item 772-L, 1951. (L27, Al)

6-L. Conservation of Zinc: Economies in Hot-Dip Galvanizing. *Chemical Age,* v. 65, Nov. 3, 1951, p. 599-602.

Surveys work done by British Non-Ferrous Metals Research Assn. (L16, Zn)

7-L. The Polishing of Silverware & Jewelry. G. E. Gardam. *Electroplating and Metal Finishing,* v. 4, Oct. 1951, p. 303-305, 312.

Mechanical finishing procedures. (L10, EG-c, Ag)

8-L. The Early Development of Metal Spraying. C. R. Draper. *Electroplating and Metal Finishing,* v. 4, Oct. 1951, p. 329-330, 333.

History, present status, and future prospects. (L23)

9-L. Metallizing Glass. Elmar Umblia. *Glass,* v. 28, Oct. 1951, p. 343-351. (Translated from *Glasteknish Tidskrift,* v. 5, No. 6, 1950.)

Procedures and applications. Characteristics of the different metals used in the process. 19 ref. (L23, T)

10-L. Ceramic Coatings Can Save Critical Alloys. W. G. Hubbell. *Iron Age,* v. 168, Nov. 22, 1951, p. 81-85.

See abstract of "Ceramic Coatings for the Hot Spots", *Finish,* item 781-L, 1951. (L27)

11-L. Mechanism and Kinetics of the Chromizing of Mild Steel in Atmospheres Containing Chromous Chloride. T. P. Hoar and E. A. G. Croom. *Journal of the Iron and Steel Institute,* v. 169, Oct. 1951, p. 101-107.

Shows experimentally that 0.1% C mild steel exposed to atmospheres containing chromous chloride at 950-1100° C. becomes coated with a Cr-rich layer. The over-all rate of chromizing is limited, in the early stages, by the rates of the reactions; and, in the later stages, by the rate of metallic interdiffusion in the growing alloy layer. Various practical chromizing processes are discussed in the light of the experimental results. 17 ref. (L15, CN)

12-L. Subsidiary Paint Tests at Birmingham: Final Report. J. C. Hudson. *Journal of the Iron and Steel Institute,* v. 169, Oct. 1951, p. 153-156.

An exposure test over 15 years, confirmed that surface preparation is the most important single factor contributing to successful protection of iron and steel, by means of paint, against atmospheric corrosion. The average life of two-coat painting schemes was nearly six times greater on a pickled surface than on a weathered and wirebrushed surface. The best of the painting schemes tested—two coats of micaceous iron ore paint—protected pickled wrought

iron perfectly. Even better results should be obtained by using a red-lead priming paint under a finishing coat of micaceous iron ore paint. Heating to dehydrate the rust improved the performance of painting schemes. (L26, Fe, ST)

13-L. De-Enameling Process Economically Reclaims Defective Enameled Ware. Kenneth Rose. *Materials & Methods*, v. 34, Nov. 1951, p. 80-81.

By stripping off imperfect vitreous finishes in a strong alkali bath, shaped iron and steel pieces can be salvaged for refinishing with consequent savings in cost and scrap. (L12, A8, CI, ST)

14-L. Primers for Ferrous Metals. T. A. Dembski, R. Marotta, F. W. Alvarez, E Berberina, S. Fine, R. L. Jeffrey, H. Jerome, H. Kelfer, B. J. Mayo, F. S. McIllwaine, W. B. Pierce, S. White, B. Wilson, and E. Zarach. *Paint, Oil & Chemical Review*, v. 114, Nov. 8, 1951, p. 116-118.

Previously abstracted from "A Study of Primers for Ferrous Metals in an Atmospheric Exposure", *American Paint Journal* (Convention Daily). See item 770-L, 1951. (L26, ST)

15-L. Finishing Procedures at Erie Art Metal. Walter Rudolph. *Products Finishing*, v. 16, Nov. 1951, p. 12-16, 18.

Various procedures such as degreasing, polishing, and painting. Diversified metal baskets, cabinets, boxes, panels, etc., are produced. (L general)

16-L. Pickling and Electroplating Beryllium-Copper Alloy Components. *Product Finishing*, v. 16, Nov. 1951, p. 22-24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48.

A study of the corrodibility of the Be-Cu alloys was made. Heat treatment and surface conditions in preparation for pickling and electroplating. (L12, L17, R general Cu)

17-L. Cleaning With Sound Waves. John Starr. *Products Finishing*, v. 16, Nov. 1951, p. 52-54, 56, 58.

Magnetostrictive and electrostrictive generators. Factors to be considered in the selection of cleaning solutions. 13 ref. (L12)

18-L. Basic Research and Test Methods Applied to Organic Finishes. Allen G. Gray. *Products Finishing*, v. 16, Nov. 1951, p. 60, 62, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86.

Reviews several recent papers including some presented at Second Symposium on Varnish and Paint Chemistry. Various test methods of evaluating properties of films. (L26)

19-L. Highlights of the American Electroplaters' Society's Research Program. Donald Price. *Products Finishing*, v. 16, Nov. 1951, p. 88, 90, 92, 94, 96, 98.

A brief summary of various projects. (L17, A9)

20-L. Ceramic Coatings for Metal Protection at High Temperatures. *Product Engineering*, v. 22, Nov. 1951, p. 177-179.

Life of components made from austenitic stainless steels, Inconel, and other high-temperature alloys can be extended as much as 100% by use of sprayed or dipped ceramic coatings. The South Wind Div. of Stewart Warner Corp. anticipates wide use in production operations. (L27, SG-h)

21-L. Selection of Corrosion-Resistant Materials for Waste Treatment Plants. Walter J. Sandel. *Sewage and Industrial Wastes*, v. 23, Nov. 1951, p. 1448-1454.

Main emphasis on protective coatings. (L general, A8)

22-L. A Student's Approach to the Theory and Practice of Vitreous Enamelling. (Continued.) J. H. Gray. *Sheet Metal Industries*, v. 28, Nov. 1951, p. 1043-1050.

Sheet-iron cover coating, brushing and transferring, production of castings for vitreous enameling, preparation of surfaces for enameling, and processing of castings after shot-blasting. (L26, ST)

23-L. Testing Organic Finishes. *Steel*, v. 129, Nov. 26, 1951, p. 86-90, 92.

Interprets tests and finish requirements in terms of finish selection, surface preparation, and application methods. 11 ref. (L26)

24-L. The Theory and Practice of Hot-Dip Tinning; Application to Wire Processing. W. E. Hoare. *Wire Industry*, v. 18, Oct. 1951, p. 867-870, 873-875; Nov. 1951, p. 969-971.

Covers tinning of copper as well as iron and steel. (L16, Sn, Cu, ST)

25-L. Durable Enamel Finishes on Zinc-Base Die-Castings. E. E. Halls. *Metallurgia*, v. 44, Oct. 1951, p. 174-178.

Properties of enamelled finishes, paying particular attention to pretreatment. (L26, Zn)

26-L. Dragout Control. Part II. Joseph B. Kushner. *Metal Finishing*, v. 49, Dec. 1951, p. 58-61, 67.

Continues a previous discussion on physical properties of plating solutions. Geometry of the object to be plated. (To be continued.) (L17)

27-L. Electrodeposition of Nickel in the Bores of Tubes Using Insoluble Anodes. A. W. Hothersall and G. E. Gardam. *Metal Finishing*, v. 49, Dec. 1951, p. 65, 69. (A condensation)

Smooth deposits of Ni having good mechanical properties may be built up to a considerable thickness on the

bores of tubes by the use of an insoluble anode which is made of or coated with lead. Details of recommended procedures. (L17, Ni, ST)

28-L. Electrodeposition on Aluminium; A Study of the Zincate Process. G. L. J. Bailey. *Metal Finishing,* v. 49, Dec. 1951, p. 66-67.

Influence of alloy composition and conditions of heat treatment upon adhesion. A theory of the mechanism of adhesion for the zincate process. (L17, Al, Zn)

29-L. Silver Plating With Insoluble Anodes. Walter R. Binai. *Metal Finishing,* v. 49, Dec. 1951, p. 68-69.

Advantages of plating with insoluble anodes. (L17, Ag)

30-L. Calculating Metal Cost for Rhodium Plating. *Metal Finishing,* v. 49, Dec. 1951, p. 79.

A chart. (L17, Rh)

31-L. Selecting Organic Coatings for Metal Products. *Product Engineering,* v. 22, Dec. 1951, p. 173-180.

Types of organic coatings and their principal uses. (L26)

32-L. Iron Plating Cheats the Scrap Pile. *Business Week,* Dec. 1, 1951, p. 108-110.

A new method of plating pure iron to any desired thickness on steel is called "Vanderloy M". The process replaces worn-off metal. (L17, Fe, ST)

33-L. Magnetic Device Improves Continuity of Pickling Line Operations. W. W. Palmer. *Steel,* v. 129, Dec. 3, 1951, p. 96, 98, 100, 102, 105, 108.

Magnetic loop control which allows strip to be run closer to bottom of tank, affords longer path through acid, and permits increased strip speeds. Cleaning line equipped with new control increased output from 400 to 580 tons per turn. (L12, S18)

34-L. Measuring Adhesion of Organic Coatings. Fred M. Burt. *Organic Finishing,* v. 12, Nov. 1951, p. 14-15.

The Adherometer, developed in the research laboratories of the Interchemical Corp., is designed to measure the stripping force required to remove a paint film from the surface of a metal test panel. (L12)

35-L. Liquid Stainless Steel. A. L. Phillips. *Organic Finishing,* v. 12, Nov. 1951, p. 16-18.

Stainless steel is reduced by a new process to a microscopically fine form and combined with vinyl plastic to form a quick-drying liquid that will give a protective coating of actual stainless steel. Applications. (L22, SS)

36-L. Flow Coating Helps Speed Production at Bendix. Virgil C. Rice. *Finish,* v. 8, Dec. 1951, p. 22-23.

A six-stage cleaning and phosphatizing unit for Bendix parts. Also a flow-coating unit. (L12, L26)

37-L. The Technical Details of Low Pressure Spraying. Roy D. Beck. *Finish,* v. 8, Dec. 1951, p. 25-28, 65-66.

Type of porcelain enamel to be used, product and its design, supervision and personnel, equipment, process technique, production and advantages, and conclusions. (L27)

38-L. Lead: Cladding Adds New Uses. *Iron Age,* v. 168, Dec. 6, 1951, p. 114.

A new process of lead cladding copper and steel. Uses whenever H_2SO_4 creates a corrosion problem. (L22, R5, Cu, ST)

39-L. Electroforming Solves Special Production Problems. John Kolb *Iron Age,* v. 168, Dec. 6, 1951, p. 151-153.

Electroforming to overcome such difficulties as extra-sharp corners and points, intricate contours, and especially tight tolerances. The process is equally adaptable to experimental or large-scale production, it can be used to turn out, first, experimental pieces and, later, production parts. Emphasis is on Cu and Ni. (L18, Cu, Ni)

40-L. Cleaning Metal Parts With Red Garnet Sand. Ira S. Roberts. *Modern Machine Shop,* v. 24, Dec. 1951, p. 214, 216.

Merits of red garnet sand are compared with silica sand. (L10)

41-L. Solution Control in the Electroplating Trade. K. E. Langford. *Electroplating and Metal Finishing,* v. 4, Nov. 1951, p. 338-339. (Excerpts from "Analysis of Electroplating and Related Solutions," to be published in book form.)

Theory and limitations of both fluorides and silico-fluorides in barrel Cr plating solutions. Mentions an electrochemical method for the determination of sulfate in Cr plating solutions. (L17, Cr)

42-L. Rochelle Copper Plating With Air Agitation. Bernard C. Lewsey. *Electroplating and Metal Finishing,* v. 4, Nov. 1951, p. 341-343.

A Rochelle Copper plating technique developed for obtaining dense lustrous deposits on the wide variety of work which the jobbing plater is called upon to undertake. Vigorous air agitation is essential and does not cause excessive carbonation. (L17, Cu)

43-L. The Complementary Processes of Metal Spraying and Painting. W. P. Jenkins and J. A. Willey. *Electroplating and Metal Finishing,* v. 4, Nov. 1951, p. 365-366.

Protection of ferrous metals by a Zn coating followed by painting. (L23, L26, Fe, Zn)

44-L. Metal Plating on Plastics. *Bakelite Review,* v. 23, Oct. 1951, p. 10-11.

A new and economical method of plating metal on phenolic, styrene and vinyl plastics which makes possible lightweight, corrosion resistant products with hard, high-polish metal surfaces. (L17)

45-L. Overhead Oven Speeds Finishing and Reduces Costs at Atlas Mfg. Company. *Industrial Heating,* v. 18, Nov. 1951, p. 2055-2056, 2058, 2060, 2062.

Conveyerized finishing system for furnace casings and boiler jackets. The ovens are gas-fired. (L26)

46-L. Abrasive Liquid Blasting. N. I. Gorayetski. *Engineers' Digest,* v. 12, Nov. 1951, p. 365-368. (Translated from *Stanki i Instrument,* v. 22, No. 7, 1951, p. 27-31.)

Experimental work on metal removal by blasting with an abrasive liquid and equipment for directing the abrasive jet onto the treated surface. Influence of individual factors on this process. (L10)

47-L. The Role of Carbon in the Formation of Thin Film Deposits. O. Goche, F. Boullon, and A. Frére. *Engineers' Digest,* v. 12, Nov. 1951, p. 375-377. (Translated from *Bulletin de la Classe des Sciences, Academie royale de Belgique,* ser. 5, v. 36, 1950, p. 330-339.)

A study to determine the general validity of the corresponding mechanism for other elements or compounds. Experiments and results obtained on cathodic atomization of Ag, Cu, and Zn. (L25, Ag, Cu, Zn)

48-L. High Pressure Setup Cleans Gear Housings. Herbert Chase. *Steel,* v. 129, Dec. 10, 1951, p. 95-96.

A conveyorized automatic washer, that replaces old hand-brushing, low-pressure spray and blowing-out arrangement. Air hammers help loosen particles that might otherwise cling to interior surfaces. (L10)

49-L. Research on Electrodeposition at the National Bureau of Standards. William Blum. *Technical News Bulletin* (National Bureau of Standards), v. 35, Dec. 1951, p. 180-185.

Developments in chromium plating and nickel deposition. Studies on the principles of electrodeposition. Future work in this field. (L17, Cr, Ni)

50-L. Pure-Iron-Plating Process. *American Machinist,* v. 95, Dec. 10, 1951, p. 197.

Advantages and applications of the Vanderloy-M plating process developed by Van der Horst Corp. Renews cylinders liners, crankshafts, etc. (L17, Fe, ST)

51-L. Production Experience Proves Diaphragm Plating. R. L. Redmond. *Iron Age,* v. 168, Dec. 13, 1951, p. 132-133.

By directing plating solution flow from the cathode through a fabric diaphragm to the work being plated, surface pits, bumps, and polarization are minimized. Also, experiences show that circulation of solution and filtration are improved. (L17)

52-L. Fishscale Susceptibility of Enamel-Steel Systems. Donald C. Bowman. *Ceramic Industry,* v. 57, Dec. 1951, p. 70-73, 116.

Preliminary investigation of a method of accelerating the formation of fishscale to study the defect in porcelain-enameled steel. Ways in which the defect can be minimized or avoided. Photomicrographs of enamel-steel interface. (L27, CN)

53-L. Electroplating of Gold Alloys. Edward A. Parker. *Plating,* v. 38, Nov. 1951, p. 1134-1140, 1156; Dec. 1951, p. 1256-1259.

Use in jewelry and decorative plating. Physical factors which affect color and composition of Au alloy plates are agitation, current density, temperature, concentration, free cyanide, pH, other salts, aging, impurities, surface finish, and anodes. Second installment: Au alloy solutions from the viewpoint of color. (To be continued) (L17, Au)

54-L. Barrel Finishing. I. Some Fundamentals. Morris S. Shipley. *Plating,* v. 38, Dec. 1951, p. 1240-1242, 1260-1261.

The variables to be considered. Applications. (L10)

55-L. Cleaning and Preparation of Metals for Electroplating. IV. Degreasing Evaluation Test: Sequential Testing. Henry B. Linford and Edw. B. Saubestre. *Plating,* v. 38, Dec. 1951, p. 1263-1266.

A number of degreasing-evaluation tests were studied, along with the newly developed atomizer test. The atomizer test was found to be the most sensitive, followed by the fluorescent-dye test. The spray-pattern, potassium ferricyanide paper, and copper sulfate dip tests were found considerably less sensitive. (To be continued.) (L12)

56-L. Nickel Plating With Insoluble Anodes. W. A. Wesley, D. S. Carr, and E. J. Roehl. *Plating,* v. 38, Dec. 1951, p. 1243-1250; disc., p. 1250, 1255.

Describes an electrolytic replenishing method devised for maintaining the Ni content and pH of a chloride-free Ni plating bath which is concurrently being depleted by Ni plating with insoluble anodes. A disadvantage of this process is that

gases are copiously liberated at the various electrodes and cause considerable spray. 10 ref. (L17, Ni)

57-L. Differential Coating Process Saves Tin. J. J. Munns. *Steel,* v. 129, Dec. 17, 1951, p. 102, 104.

Different weight of coating on each side of sheet provides stock for containers with inside surface capable of resisting attack of product and outside surface capable of withstanding atmospheric conditions. (L17, Sn, ST)

58-L. Electrodeposited Tin-Nickel Alloy Coatings. N. Parkinson, S. C. Britton, and R. M. Angles. *Tin Research Institute,* 1951, 12 pages.

Previously abstracted from *Sheet Metal Industries.* See item 618-L, 1951. (L17, R1, R2, Sn, Ni)

59-L. The Abrasion Resistance of Sulphuric Acid Anodic Films on Aluminum and Its Alloys. R. C. Spooner. *Canadian Journal of Technology,* v. 29, Nov. 1951, p. 479-491.

The abrasion value of anodic coatings produced on Al alloys. Effect on the abrasion value of five process variables; anodizing time, sealing time, air aging, current density, and electrolyte temperature, was determined. 13 ref. (L19, Q9, Al)

60-L. Surface Finish. R. E. Reason. *Australasian Engineer,* Oct. 8, 1951, p. 48-59; disc., p. 59-64.

Various methods of measuring surface finish and various instruments used for the purpose. Numerical assessment of the surface. Ease and accuracy of instrumentation for each method. 15 ref. (L15)

61-L. The Silvering of Plastics. Dougal McPherson. *British Plastics,* v. 24, Nov. 1951, p. 383-384.

Emphasis on a new British patented process for electrodeposition of silver on plastic objects. (L17, Ag)

62-L. The Protection of Metallic Surfaces by Chromium Diffusion. Part IV. Modern Chromizing Methods. R. L. Samuel and N. A. Lockington. *Metal Treatment and Drop Forging,* v. 18, Nov. 1951, p. 495-502, 506.

Details of chromizing methods developed since 1938. The D.A.L. and B.D.S. processes, which employ pack-chromizing techniques, have proved to be the most practicable and are in commercial use today. (To be continued.) (L15, Cr)

63-L. The Production of Relief Designs on Aluminium Surfaces by Anodic Oxidation. G. O. Taylor. *Metallurgia,* v. 44, Oct. 1951, p. 243-244.

Method is based on the intensely hard anodic film produced by anodizing in H_2SO_4 under suitable conditions. The process is capable of a number of variations whereby an interesting range of decorative finishes is possible. (L19, Al)

64-L. Electrolytic Polishing and Anodic Oxidation of Aluminum; Their Study by Electron Diffraction. (In French.) M. Halfawy. *Revue de Métallurgie,* v. 48, Oct. 1951, p. 787-792.

Some results of experiments. 15 ref. (L13, L19, M21, Al)

65-L. Cleaning of Stainless Steel. (In French.) G. Rossi-Landi. *Métallurgie et la construction mécanique,* v. 83, Oct. 1951, p. 763, 765.

Use of various chemical procedures. (L12, SS)

66-L. Anodic Coloration of Light-Alloy Watch Rims. (In French.) Alexandre Mikailoff. *Revue de l'Aluminium,* v. 28, Oct. 1951, p. 372. (Reprinted from *Suisse Horlogére.*)

Process and properties of the product. (L19, Al)

67-L. Observations Relative to the Metallization of Surfaces by Evaporation in a Vacuum. (In French.) Louis Dunoyer. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 233, Oct. 22, 1951, p. 919-921.

Treatment of the surface in the vacuum before metallization; choice of metal constituting the heating device; treatment which makes it possible to increase considerably the hardness of the deposited metallic layer. (L25)

68-L. Operation and Results Obtained With a Machine for Descaling Wire. (In German.) Walter Zwierz. *Stahl und Eisen,* v. 71, Oct. 25, 1951, p. 1133-1135; disc., p. 1135-1137.

Development and operation of the "Gorcy" machine for mechanical descaling of steel wire. (L10, ST)

69-L. Improving Efficiency in Bright-Drawn Steel-Bar Pickling Plants. (In German.) Friedrich von der Heide. *Stahl und Eisen,* v. 71, Oct. 25, 1951, p. 1148-1154; disc., p. 1154-1155.

Pickling processes and reactions. Possibilities of conservation of acids, pickling time, and materials. Effects of acid concentration, temperature, and nature of scale on pickling time for various steels. (L12, ST)

70-L. "Interior Surfaces" in Hot Galvanizing. (In German.) H. Bablik. *Metall,* v. 5, Nov. 1951, p. 479-480.

Summarizes papers published by author and associates concerning "inner surfaces" which are created during hot galvanizing. Proposes general law for the creation and consequences of enlarged surface areas or pores. (L16, Zn, ST)

71-L. Preliminary Cleaning—A Problem in the Metallurgical Industries. (In Portuguese.) Alberto Paulo Ribbe.

Boletim da Associacao Brasileira de Metais, v. 7, July 1951, p. 366-377.

Various surface cleaning methods and their applicabilities to different problems. (L12)

72-L. (Book) **Paint Film Defects. Their Causes and Cure.** Ed. 3. Manfred Hess. 544 pages. 1951. Reinhold Publishing Corp., 330 West 42nd St., New York 18, N. Y.

Reference book of causes and remedies for paint failures. Various materials, their application and storage. The defects are arranged in accordance with a logical classification system and are discussed in turn. Includes coatings on both metals and nonmetals. Numerous footnote references, and bibliography. (L26)

73-L. (Book) **Electro-Plating. A Survey of Modern Practice.** Ed. 6. Samuel Field and A. Dudley Weill. 546 pages. Pitman Publishing Corp., 2 W. 45th St., New York 19, N. Y. $6.00.

Designed primarily for the working plater. Explains in considerable detail the fundamental principles of chemistry, electricity, and electrochemistry. Various types of equipment, and complete information on the deposition of both common and unusual metals. (L17)

74-L. (Book) **Electroplating and the Engineer.** Alan Whittaker. 87 pages. Emmott & Co., Ltd., 31 King St., West, Manchester 3, England. (Mechanical World Monograph 64.) 4 s.

Does not attempt to teach the practice of plating, but rather to introduce the engineer to the process. Equipment; type of material in relation to its suitability for plating; various methods of cleaning and surface treating. Each type of plating is considered in detail. Special chapters are devoted to Cr and alloy plating, and to electrolytic finishing and polishing. (L17)

75-L. Producing Low-Cost Molds for Aircraft Parts by Metallizing. G. B. Lewis and L. Frost. *Machinery* (American), v. 58, Dec. 1951, p. 152-156.

Procedures employed. Hydrocal, phenolic, ceramic, aluminum, and Kirksite molds were metallized and were shown to give satisfactory results in forming low-pressure laminated plastics. (L23, T5)

76-L. Keeping Stainless Steel Clean. *Machinery* (American), v. 58, Dec. 1951, p. 252.

Methods of cleaning stainless steels in order to insure longer life. (L12, SS)

77-L. Conservation in Enameling Operations. Evan M. Oliver. *Ceramic Age,* v. 58, Dec. 1951, p. 28-30.

Previously abstracted from *Better Enameling.* See item 739-L, 1951. (L27)

78-L. Application of Dilatometric Analysis to the Enameling of Cast Iron. (In French.) Auguste Le Thomas and Pierre Tyvaert. *Fonderie,* Nov. 1951, p. 2685-2691.

Results of a comparative study of the expansibility of cast iron and enamel, explaining dilatometric measurements and some examples of their application. (L26, P12, CI)

79-L. Painting by Flotation Method. L. B. Donovan. *American Paint Journal,* v. 36, Dec. 24, 1951, p. 64-68.

New method for water-sealed gas holders. The paint is floated on the water seal. As a lift descends through the film of paint and into the water, positive hydraulic pressure forces the paint into the lift surface and distributes it uniformly. As the lift rises, surplus paint flows off, to float again on the water seal where it can be pumped off for reuse. The resulting coating was shown to be more effective in preventing corrosion than those applied by conventional methods. (L26, ST)

80-L. Cleaning of Steel Test Panels for Paint. Thomas Rice. *ASTM Bulletin,* Dec. 1951, p. 50-58.

Two basic cleaning methods for removal of oil and smut were adopted, namely, solvent spray cleaning and trichlorethylene vapor degreasing; also two modifications of these in which a phosphoric acid dip is used. A standard method for packaging panels has been adopted. Methods for testing cleaned panels for cleanliness and surface activity. Tables and test-panel photographs. (L12, ST)

81-L. Ti-Loc One Coat White Titanium Direct to Non-Premium Steel. Paul S. Cecil. *Better Enameling,* v. 22, Dec. 1951, p. 8-12.

See abstract from *Finish,* item 779-L, 1951. (L27, ST)

82-L. Methods for Testing for Enamel Coating Discontinuities. Stanley C. Orr. *Better Enameling,* v. 22, Dec. 1951, p.16-19, 31.

A compilation of procedures and equipment in common use. In general, these tests are based upon the fact that a continuous enamel layer possesses excellent electrical insulating properties. (L27, S13)

83-L. Surface Protection Via Phosphate Coatings. Melvin G. Crandell. *Canadian Chemical Processing,* v. 35, Dec. 1951, p. 994-996, 998-999.

"Bonderite"—a chemical compound that produces a phosphate coating on steel, Fe, Zn, Cd, and Al and their alloys—is also used as an aid

in the deep drawing of metals. Applications in corrosion prevention. (L14, G21)

84-L. Alternatives to Nickel-Chrominum Plating; Some British Views. *Electroplating and Metal Finishing,* v. 4, Dec. 1951, p. 379-380.

Some of the salient points which emerged from the Practical Platers' One-Day Conference, held by the Institute of Metal Finishing in Birmingham on Nov. 6, 1951. (L17, Ni, Cr)

85-L. The Protection of Steel by Sprayed Aluminium. W. E. Ballard. *Electroplating and Metal Finishing,* v. 4, Dec. 1951, p. 395-399.

A mechanism is postulated for the formation of the rust stains which sometimes appear on Al-sprayed steel. Methods for avoiding the staining are suggested. (L23, ST, Al)

86-L. Flow Coating at Maytag. Max Schmiedeke, Jr. **Flow Coating Conventional Washer Parts at Maytag.** Matt Heuertz. *Finish,* v. 9, Jan. 1952, p. 31-32.

Procedures and equipment in washing-machine production. (L26, CN)

87-L. Infrared Heaters Improve Drying of Ferguson Tractor Parts. *Industrial Heating,* v. 18, Dec. 1951, p. 2243-2244, 2253. (L26)

88-L. Recent Ceramic Coatings for High-Temperature Alloys. *Industrial Heating,* v. 18, Dec. 1951, p. 2263-2264, 2266, 2268, 2320, 2322.

See abstract of "The Growing Role of Protective Coatings for Metals in High Temperature Service", W. N. Harrison, *American Society for Testing Materials,* "Symposium on Corrosion of Materials at Elevated Temperatures," item 628-L, 1951. (L27, SG-h, ST)

89-L. Photos on Aluminum Resist Heat and Scratching. Eugene Wainer. *Iron Age,* v. 168, Dec. 20, 1951, p. 104-105.

Pictures, nameplates, and drawings reproduced photographically on aluminum have a hard, scratch-resistant, glass-like surface. The image is substantially grainless and halftones may be faithfully reproduced. The method uses photographic and anodic processes. Use of dyes gives many rich color effects. (L14, T9, Al)

90-L. Sherardizing; Modern Developments and Applications. A. E. Williams. *Iron and Steel,* v. 25, Dec. 1951, p. 529-533.

The nature of the coating obtained and the essential ingredients of the mixture used. Typical applications. (L16, T general, ST, Zn)

91-L. Protective Coatings Used on Gas Pipe. Roy T. Richards and N. K. Senatoroff. *Journal, American Water Works Association,* v. 43, Dec. 1951, p. 1015-1016.

Various methods used by the central Arizona Light and Power Co. in the protection of its cast iron pipes. (L general, CI)

92-L. Vitreous Enamel Finishes for Aluminium; A Review of Recent Investigations. J. C. Bailey. *Light Metals,* v. 14, Dec. 1951, p. 647-656.

The properties required in an enamel finish on Al. Data on the influence of alloy composition and pretreatment on appearance and adhesion of lead-free enamel are tabulated. Results of performance tests on some enamels. (L27, Al)

93-L. Electrodeposited Tin Alloy Coatings Are Promising Alternates for Tin Plate. Kenneth Rose. *Materials & Methods,* v. 34, Dec. 1951, p. 70-72.

Process and applications for Sn-Cu, Sn-Zn, and Sn-Ni plating. (L17, Sn, Cu, Zn, Ni)

94-L. Alternatives to Nickel-Chromium Plating. Answers to Queries in "Bright Zinc" Discussion. *Metal Industry,* v. 79, Dec. 14, 1951, p. 503-504.

Discussion on a paper "Bright Zinc Plating" by N. A. Tope. (L17, Zn, Ni, Cr, ST)

95-L. Nickel Plated Slides. H. H. Symonds. *Metal Industry,* v. 79, Dec. 14, 1951, p. 504-505.

Investigation on a defective finish encountered on a number of Ni-plated, case hardened slides. Micrographs. (L17, Ni)

96-J. Flame Hardening and Tempering of Steel. *Metal Progress,* v. 60, Dec. 1951, p. 120, 122, 124. (Translated and condensed from paper by Hans Bühler and Hans Wilhelm Grönegress.)

Previously abstracted from *Stahl und Eisen.* See item 142-J, 1951. (J2, J29, ST)

97-L. What Platers Can Do About the Nickel Shortage. *Metal Treating,* v. 2, Nov.-Dec. 1951, p. 8-9, 16. (Reprinted from *Steel.*)

Plating and coating techniques available where restrictions on Ni for plating make conventional Cu-Ni-Cr finishes impossible. (L17)

98-L. Ceramic Coatings for Prevention of Carbon Adsorption in Four Heat Resistant Alloys. Joseph W. Pitts and Dwight G. Moore. *National Advisory Committee for Aeronautics,* Technical Note 2572, Dec. 1951, 14 pages.

Three ceramic coatings were applied to Inconel and three 18-8 type stainless steels and then tested for their effectiveness in preventing carbon absorption under strongly carburizing conditions, that is, box carburizing. At 1350° F. no carbon pickup occurred after the 4-hr. treatment but, at 1500° and 1650° F., carbide precipitation was evident in the uncoated stabilized 18-8 steels extending down from the surface to a depth as great as 0.007 in. In most cases the ceramic coatings completely prevented the adsorption. Tables, graphs, and photomicrographs. 11 ref. (L27, J28, Ni, SS)

99-L. Substitutes for Nickel in Electroplating. J. J. Dale. *Plating Notes,* v. 3, Oct. 1951, p. 163-173.

Factors influencing choice of the metal to be deposited, corrosion characteristics of various metals, and other factors involved in making the choice. 13 ref. (L17, R5, Ni)

100-L. Finishing Precision Aircraft Accessories. Gilbert C. Close. *Products Finishing,* v. 16, Dec. 1951, p. 14-18, 20.

Finishing operations on a small Al air-expansion turbine. Cleaning, surface treating, and painting operations are described. (L12, L26, Al)

101-L. Quick Clear Dip Cuts Cost of Finishing Zinc Die Castings and Plated Parts. Arthur P. Schulze. *Products Finishing,* v. 16, Dec. 1951, p. 24-28, 30, 32.

Process is called "Unichrome Clear Dip". Advantages are its greater corrosion resistance and improved adhesion of organic coating on Zn. (L14, Zn)

102-L. Recent Developments in Ceramic Coatings for Steel. Allen G. Gray. *Products Finishing,* v. 16, Dec. 1951, p. 44, 46, 48, 50, 54, 56, 58, 60, 62, 66, 68, 70, 74.

As reported by various investigators. Some theories for adherence of porcelain enamels to steel. Results of adherence and abrasion tests. Data are tabulated. (L27, ST)

103-L. Forum on Technical Progress: Cleaning & Finishing. *Steel,* v. 130, Jan. 7, 1952, p. 401-402, 404, 407-408, 410, 412, 415, 418, 420, 423-424.

Brief discussions by men from industry on the present situation and anticipations for 1952. (L general)

104-L. Electrolytic-Slide-Polishing. (In English.) Kenzo Nagai and Kunio Mano. *Science Reports of the Research Institutes, Tohoku University,* ser. B, v. 1-2, Mar. 1951, p. 391-398.

Electropolishing is recognized as a convenient method for polishing metals. So-called "electrolytic-slide polishing", sometimes proves to be better and more convenient. In the process acid electrolyte is used on some metals (Cu, Al, Zn, Ni, Fe, Mo, and their alloys), cyanide on precious metals (Ag, Au, Pt), and basic electrolytes on Al, Zn, and W. Explains the mechanism of metal polishing by this method and compares experimental results with those of conventional electropolishing. (L13)

105-L. Stresses in Enameled Cast Iron. (In German.) Alfred Thürmer. *Berichte der Deutschen Keramischen Gesellschaft e.V. und des Vereins Deutscher Emailfachleute e.V.,* v. 28, Sept. 1951, p. 504-511.

Methods of computing thermal expansion of enamels. Satisfactory enameling requires consideration not only of composition and treatment of enamel, but also of shape and condition of the casting. Data are tabulated. (L27, CI)

106-L. Latest Developments in Cyanide Zinc Baths. (In German.) Heinz W. Dettner. *Metalloberfläche,* ser. B, v. 3, Oct. 1951, p. B145-B148.

A review on the basis of the literature, with particular regard to new American processes. 36 ref. (L17, Zn)

107-L. Metal Plating on Plastics. *Automotive Industries,* v. 106, Jan. 1, 1952, p. 49.

How phenolic, styrene, and vinyl plastics may be plated with a hard film of Cu, Ag, Cr, or other metal by employing recently developed mass-production techniques. (L17, Cu, Ag, Cr)

108-L. After-Deposits Resulting from Chemical Cleaning Process. P. H. Cardwell. *Combustion,* v. 23, Dec. 1951, p. 67-68.

Amount and type of deposits. Causes for corrosion on the internal metal surface of the boiler. (L12, R5)

109-L. The Protection of Metallic Surfaces by Chromium Diffusion. Part V. Properties of Chromised Steel. R. L. Samuel and N. A. Lockington. *Metal Treatment and Drop Forging* v. 18, Dec. 1951, p. 543-548, 556.

Hardness, ductility and other mechanical properties; weldability, and original data on the resistance to corrosion and oxidation in various media. (To be continued.) (L15, Q general, R general, ST, Cr)

110-L. The Electrodeposition of Molybdenum and Its Alloys. F. W. Salt. *Murex Limited Review,* v. 1, No. 9, 1951, p. 201-210.

The history of Mo deposition; recent work. (L18, C23, Mo)

111-L. Graining of Lithographic Plates. Frank E. England. *National Lithographer,* v. 58, Dec. 1951, p. 28-29.

The essential components for graining Zn or Al plates. Abrasives that can be used. The graining and regraining procedures. (L10, Zn, Al)

112-L. Factors Affecting the Testing of Automotive Finishes. Ralph J. Wirshing and Werdley D. McMaster. *Organic Finishing,* v. 12, Dec. 1951, p. 8-11.

See abstract from *Paint, Oil, & Chemical Review,* item 510-L, 1951. (L12, L14, L26, CN, Cr)

113-L. Chromic Acid Anodizing Equipment and Its Practical Use. Herberth E. Head. *Plating,* v. 39, Jan. 1952, p. 40-41, 50.

Factors to be considered which promote greater efficiency as well as provide safe working conditions for the workers. (L19, A7, Al)

114-L. Electroplating of Gold Alloys. (Concluded.) Edward A. Parker. *Plating,* v. 39, Jan. 1952, p. 43-46, 50.

Includes data on green gold, white gold, antique gold, rose and green-gold smut. After-treatment is briefly discussed. 42 ref. (L17, Au)

115-L. Making Finishing Compositions. L. R. Eastman. *Plating,* v. 39, Jan. 1952, p. 47-49.

Various steps in formulating abrasive compositions used for polishing and buffing. (L10)

116-L. Cleaning and Preparation of Metals for Electroplating. IV. Degreasing Evaluation Tests: Sequential Testing. Henry B. Linford and Edw. B. Saubestre. *Plating,* v. 39, Jan. 1952, p. 55-63.

Statistical analysis of results. Data are tabulated. (L12, L17)

117-L. Review of Current Literature: Diaphragm Tanks. T. A. Hood. *Plating Notes,* v. 3, Oct. 1951, p. 178-183.

Includes diagrams. (L17)

118-L. Surface Finish. R. E. Reason. *Australasian Engineer,* Nov. 7, 1951, p. 59-61.

Author's reply to discussion on paper published in Oct. 8, 1951 issue. See item 60-L, 1952. (L15)

119-L. Notes on the Metallizing of Plastics. D. McPherson. *Metallurgia,* v. 44, Dec. 1951, p. 290, 310.

An outline of processes in use for metallizing plastics. Progress toward alloying plastic and metal without noticeable interfacial weakness. (L23)

120-L. Weld Deposition of Stellite on Bearing Surfaces of Shafts. (In French and German.) Paul Hartmann. *Zeitschrift für Schweisstechnik; Journal de la Soudure,* v. 41, Nov. 1951, p. 211-213.

Details of methods. (L24, Co, SG-m)

121-L. (Book) **Chemical and Physical Determinations for Porcelain Enamel Plants.** Michael Bozsin. 76 pages. Ferro Enamel Corp., 4150 E. 56th St., Cleveland.

Information the ceramic engineer needs to study chemical and physical conditions of a porcelain-enameling furnace and their effects on finished ware. (L27)

122-L. (Book) **Metallizing Handbook.** 1951. 250 pages. Metallizing Engineering Co., Inc., 3814 30th St., Long Island City, N. Y. $3.00.

Various methods of surface preparation and the application of metallized coatings for machine-element work, for corrosion protection, and for special production jobs. Applications include repair of blowholes in castings, mass coatings in tumbling barrels, model work, glass, and ceramics. Numerous photos, diagrams and charts. (L23)

123-L. Fast Economical Descaling by Use of Induction Heat. Homer Kincaid. *Automotive Industries,* v. 106, Jan. 15, 1952, p. 43, 98.

Results of the process for removal of surface scale from metal parts after heat treatment. Theory is discussed. (L10, ST)

124-L. Fishscale Susceptibility of Enamel-Steel Systems. Donald C. Bowman. *Better Enameling,* v. 23, Jan. 1952, p. 6-11.

See abstract from *Ceramic Industry;* item 52-L, 1952. (L27, CN)

125-L. Development of Fused Metallized Coatings. Harrison S. Sayre. *Welding Journal,* v. 31, Jan. 1952, p. 35-39.

A review of investigations conducted in the development of materials, techniques, and procedures for the application of hard overlays in the form of sprayed metal coatings remelted and fused by the oxy-acetylene torch. (L23, L24)

126-L. Aluminum Electroplated on Steel From Fused Salt Bath. F. R. Collins. *Iron Age,* v. 169, Jan. 17, 1952, p. 100-101.

Al has been successfully electroplated on steel from a fused $AlCl_3$-NaCl salt bath. The plate is uniform and no interfacial layer of Fe-Al alloy occurs. Coated steels show high resistance to rusting in industrial, seacoast and humid atmospheres. Coating is free of continuous pores. Photomicrographs. (L17, Al, ST)

127-L. Induction Heat Cuts Descaling Costs. *Iron Age,* v. 169, Jan. 17, 1952, p. 106.

Method at Farmall Works of International Harvester whereby steel bars move automatically from fur-

nace to inductor where heat rapidly expands scale which breaks off. The scale collects around left side of inductor and falls to receptacle. Water spray after quench aids operation. (L10, ST)

128-L. The Influence of Spraying Conditions on the Grain Size of Sprayed Metal Deposits. P. Koch. (Translated and condensed.) *Engineers' Digest,* v. 12, Dec. 1951, p. 406-407, 416.

Previously abstracted from *Metalloberfläche.* See item 805-L, 1951. (L23)

129-L. Newly Developed Electrolytic Iron Builds up Worn Bearing Surfaces. *Western Metals,* v. 10, Jan. 1952, p. 31-32.

"Vanderloy M" process for reclamation of such items as power and compressor cylinders, crankshafts, and the like. Vanderloy M is an iron which is electrodeposited in a fine columnar structure perpendicular to the base metal. Hard Cr is often applied in a thin layer on top of the Fe deposit. (L17, Fe, ST)

130-L. X-Ray Study of the Reactions at the Steel Surface When Titania Enamel Is Applied Directly. Gordon S. Douglas and Jason M. Zander. *Journal of the American Ceramic Society,* v. 35, Jan. 1, 1952, p. 5-11.

Detailed X-ray diffraction study of reactions during firing of a titania enamel directly on steel. The theory that adherence depends on presence of an oxidizing agent in the enamel adjacent to the steel was applied and a correlation obtained on the assumption that dissolved TiO_2 is the adherence-promoting oxidizing agent. (L27, ST)

131-L. Islanding—A Surface Characteristic of Some Porcelain Enamels. M. K. Blanchard and W. A. Deringer. *Journal of the American Ceramic Society,* v. 35, Jan. 1, 1952, p. 12-15.

Appearance and characteristics of islanded enamel surfaces. Possible modes of formation. Results of corrosion tests on islanded and nonislanded surfaces show the nonhomogeneity of some porcelain enamels. (L27, R general, ST)

132-L. Laboratory Tests Select Best Blast Cleaning Method. Eugene F. Anderson. *Steel,* v. 130, Jan. 21, 1952, p. 62-65.

Airless blast equipment and procedures designed for various types of parts. (L10)

133-L. Tin Plating Advances Save Metal. *Steel,* v. 130, Jan. 21, 1952, p. 66-67. (Based on paper by C. T. Kunze and A. R. Wiley).

Method for measuring tinplate coating developed at research dept., American Can Co., is based on the fact that anodic dissolution of tin coatings on steel proceeds with full current efficiency in HCl enabling the coating weight of a defined area to be calculated by Faraday's law. Sn-Zn and Sn-Ni plating-bath compositions are given. (L17, Sn, Zn, Ni)

134-L. Clad Steel Bullet Jackets Conserve Copper and Zinc. E. J. Reardon. *Steel,* v. 130, Jan. 21, 1952, p. 68-69.

New-type welded angle cladding method which produces 2000-3000 lb. 17-in. wide billets and raises yield of usable clad strip. Many thicknesses are possible. 90-10 Cu-Zn or 80-20 Cu-Ni cladding is applied to steel strip used for making the bullet jackets, formerly entirely made from above alloys. (L22, CN, Cu)

135-L. Iron Plating Restores Worn Parts. Russell Pyles. *Iron and Steel Engineer,* v. 29, Jan. 1952, p. 151-152.

Electrolytic plating of iron called "Vanderloy M". Work is being conducted to adapt the bath to alloy plating. (L17, Fe)

136-L. Ceramics Investigation; The Effect of Ceramic Coated Alloys at Elevated Temperatures. Wilson G. Hubbell. *Western Machinery and Steel World,* v. 43, Jan. 1952, p. 82-85.

A series of tests conducted with ceramic coated exhaust system components show that the ceramic provides the protection necessary to extend the life of 19-9DL stainless steel at elevated temperatures encountered in aircraft service. Micrographs. (L27, SS)

137-L. New Trends in the Chemistry of Barrel Finishing. William E. Brandt. *Products Finishing,* v. 16, Jan. 1952, p. 24, 26, 28, 30.

Selection of a cleaner depends on the purpose of the operation and the particular metal processed. (L10)

138-L. Fitting Vapor Degreasers to the Job. Gilbert C. Close. *Products Finishing,* v. 16, Jan. 1952, p. 32-34, 36, 38.

Factors to be considered. (L12)

139-L. Hot Lacquer Provides Finish for Dental Equipment. Ezra A. Blount. *Products Finishing,* v. 16, Jan. 1952, p. 41-44.

Finishing operations on parts fabricated from cast Al, cast iron, and steel stampings. Advantages of the hot-lacquer spray process. (L26, Al, CI, ST)

140-L. Spotlighting Finishing Progress. Allen G. Gray. *Products Finishing,* v. 16, Jan. 1952, p. 46, 48, 50, 52, 54, 56, 58, 60, 62, 66, 68, 72, 74, 76, 78, 80.

Some recent contributions on electrochemical and chemical coatings for aluminum; lacquers for fin-

ishing military products; mechanism of paint blistering in sea water; corrosion resistance of anodized titanium; and acid recovery in continuous strip pickling. (L general)

141-L. Considerations in the Use of Infrared Heating for Drying Organic Coatings on Die Castings. *Precision Metal Molding,* v. 10, Jan. 1952, p. 46-47.

This process allows very low or very high rates of air flow past the work, as may be desired, without affecting the actual temperature of the work. (L26)

142-L. The Deposition of H. F. Crystal Electrodes by Vacuum Coating. L. Holland. *Electronic Engineering,* v. 24, Jan. 1952, p. 10-13.

The present method of frequency adjusting h.f. crystals by combined cathodic sputtering and electroplating techniques can be largely replaced by the single operation of evaporation coating. Details of apparatus. Emphasis is on application of gold and other precious metals onto quartz crystals. (L25, Au, EG-c)

143-L. Protective Finishes. Part 1. Finishes and Undercoating. Norman P. Gentieu. *Machine Design,* v. 24, Jan. 1952, p. 108-114, 196, 198.

Inorganic films formed on metals for the purposes of coloring, rust or corrosion proofing, wear resistance, protecting rubbing surfaces, or improving joint adhesion. Reaction equations, tables giving military finish specifications and protective-finish and corrosion-resistance data. (L general, ST, Al, Zn)

144-L. Metal Finishing Developments in 1951. Walter A. Raymond. *Metal Finishing,* v. 50, Jan. 1952, p. 50-56.

102 references. (L general)

145-L. Successful Hard Chrome Plating; The Story of Nutmeg Chrome Corp. *Metal Finishing,* v. 50, Jan. 1952, p. 58-59, 70.

Illustrated description of plant in Hartford, Conn. (L17, Cr)

146-L. Dragout Control. Part III. Joseph B. Kushner. *Metal Finishing,* v. 50, Jan. 1952, p. 60-64, 74.

Methods for recovery of dragout losses from plating tanks. 11 ref. (L17)

147-L. Insulation for Plating Racks. J. A. Williams. *Metal Finishing,* v. 50, Jan. 1952, p. 65-70.

Advantages and disadvantages of rubber, wax, and resin. Application and maintenance problems. (L17)

148-L. Calculating Metal Cost for Palladium Plating. *Metal Finishing,* v. 50, Jan. 1952, p. 81.

A chart. (L17, Pd)

149-L. Basic Principles of the Pickling and Etching of Steels and Their Application to the Production of Stainless Steel Sheet. H. E. Zentler-Gordon. *Sheet Metal Industries,* v. 29, Jan. 1952, p. 5-10, 16.

Includes graphs and illustrations of equipment. (L12, ST, SS)

150-L. Stripping of Electrodeposits. R. H. Keller. *Defense Research Laboratories, Commonwealth of Australia,* Information Circular 16, Sept. 1951, 23 pages.

Published methods for stripping brass, bronze, Cd, Cr, Cu, Au, Pb, Ni, Pd, Pt, Rh, Ag, Sn, Zn, and speculum from the base metals upon which they are usually plated. (L12)

151-L. Chromizing, a Process Effecting Metals Savings. (In German.) H. Kalpers. *Metall,* v. 5, Dec. 1951, p. 546-548.

The chromizing process and its application in industry. Possibilities for use of chromized iron and wood screws, rather than alloy steels. (L15, ST)

152-L. Zinc Plating in Acid Baths; A Review of the Journal and Patent Literature. (In German.) Richard Springer. *Metalloberfläche,* ser. B, v. 3, Oct. 1951, p. B148-B154; Nov. 1951, p. B168-B169.

80 references. (L17, Zn)

153-L. The Influence of Rectified Current Alternations Upon the Growth of Electrodeposits. (In German.) Max Ed. Beckmann and Friedrich Maass-Graefe. *Metalloberfläche,* ser. A, v. 5, Nov. 1951, p. A161-A169.

Zn, Cu, Ni, and Cr deposits from various electroplating baths. In most cases, no change of the deposit was effected by changing the alternation curve of the rectified current. Data are tabulated; graphs illustrate the results. (L17, Sn, Cu, Ni, Cr)

154-L. Investigation of the Spraying of Zinc Through Ferrous Tubing at Increasing Wall Temperatures. (In German.) Otto Van Rossum. *Metalloberfläche,* ser. A, v. 5, Nov. 1951, A172.

The tubing is used for conduction of acetylene gas in the spray process. Possibility of causing decomposition of the acetylene at the temperatures encountered (up to 142° C.) is believed to represent a serious hazard. (L23, Zn, ST)

155-L. Electroplating of Fine Zinc Alloys. (In German.) K. Löhberg and H. Nann. *Metalloberfläche,* ser. B, v. 3, Nov. 1951, p. B161-B165.

Practical procedure, with emphasis on Cu plating, including recommended surface-preparation procedure. Micrographs and photographs. (L17, Cu, Zn)

156-L. Influence of Certain Technological Factors on Smoothness of Burnished Surfaces. (In Russian.) D. M. Tarasenko. *Stanki i Instrument,* v. 22, Apr. 1951, p. 25-26.

An experimental study was made for five steels. Data are tabulated and charted. (L10, ST)

157-L. New Electrolytes for Tinning. (In Russian.) V. I. Sotnikova and M. A. Loshkarev. *Zhurnal Prikladnoi Khimii,* v. 24, Apr. 1951, p. 361-372.

The throwing power of H_2SO_4 tin plating baths with various additions was studied. The porosity of the cathodic deposit for the same conditions was measured. Data are tabulated. 14 ref. (L17, Sn)

158-L. Protection of Articles From Corrosion by Cold Phosphating Methods. (In Russian.) V. S. Lapatukhin. *Zhurnal Prikladnoi Khimii,* v. 24, Apr. 1951, p. 373-382.

See abstract from *Chemical Age;* item 630-L, 1951. (L14)

159-L. Study on Liquid Honing. I. (In Japanese.) Hidehiko Takeyama. *Journal of Mechanical Laboratory,* v. 5, July 1951, p. 111-114.

Possibility of vapor blasting with modified sandblasting equipment. Need for an improved nozzle is indicated. Experimental results and a fundamental equation for blasting of ductile materials such as mild steel. Diagrams and graphs. (L10, CN)

160-L. Study of Abrasives. I-IV. (In Japanese.) Wataru Funahashi. *Journal of Mechanical Laboratory,* v. 5, Aug. 1951, p. 176-182; Sept. 1951, p. 192-197.

Part I: Microstructure of Japanese-produced abrasives made from quartzite. Part II: Use for polishing of Cu electrodeposits. Part III: Use for Ag elctrodeposits. Part IV: Use for Ni, Cu, Al, brass, and "Almite" electrodeposits. Graphs, tables and micrographs. (L10, Cu, Al, Ni)

161-L. Recent Ceramic Coatings for High-Temperature Alloys. *Ceramic Age,* v. 59, Jan. 1952, p. 29-30.

Various types of ceramic coatings developed by National Bureau of Standards and applications. (L27)

162-L. Determines Water in Frit is the Main Source of Hydrogen Defects. *Ceramic Industry,* v. 58, Feb. 1952, p. 65.

See abstract of "Relative Importance of Various Sources of Defect-Producing Hydrogen Introduced into Steel During the Application of Porcelain Enamel," *Journal of the American Ceramic Society:* item 168-L, 1952. (L27, ST)

163-L. Use Inhibitors to Help Conserve Pickle Acids. Paul A. Huppert. *Ceramic Industry,* v. 58, Feb. 1952, p. 61-62.

How inhibitors work and their advantages for enamelers, a few of which are metal conservation, smoother metal surfaces at less cost, and elimination of over-pickling. (L12, ST)

164-L. Vanderloy M. *Diesel Power and Diesel Transportation,* v. 29, Dec. 1951, p. 44-47.

Process of iron deposition for repair of worn parts. (L22, Fe)

165-L. Surfacing by Arc Welding. Gorham Woods. *Industry & Welding,* v. 25, Feb. 1952, p. 58-59, 61, 63, 64-67, 98-99.

Abrasive wear. Recommends various carbides and other wear resistant materials for the surfacing electrodes. (L24, T5, C-n)

166-L. Properties of Alloy Steels for High Temperature Service. III. (Concluded). *Industrial Heating,* v. 19, Jan. 1952, p. 82, 84, 86.

Includes a condensed version of "Cladding of Molybdenum for Service in Air at Elevated Temperature" W. L. Bruckart and R. L. Jaffee, previously abstracted from *American Society for Metals,* Preprint 18, 1951. See item 626-L, 1951. (L24, Mo)

167-L. Control Addition Agent Vital in Lead-Tin Plating. J. B. Mohler. *Iron Age,* v. 169, Feb. 7, 1952, p. 139-141.

Small amounts of Cu, Sb or As increase strength and fatigue resistance. Gelatin or glue in the bath give a fine-grained deposit. Resorcinol minimizes change in deposit composition; best determined by a bromination method. 10 ref. (L17, S11, Pb, Sn)

168-L. Relative Importance of Various Sources of Defect-Producing Hydrogen Introduced Into Steel During the Application of Porcelain Enamels. Dwight G. Moore, Mary A. Mason, and William N. Harrison. *Journal of the American Ceramic Society,* v. 35, Feb. 1, 1952, p. 33-41.

Deuterium was used to trace the source of defect-producing hydrogen in steel. The deuterium was introduced, in turn, as a replacement for protium in the pickling acid, the milling water, the quenching water, the chemically combined water in the clay, and the dissolved water in the frit. The gases evolved during fishscaling of the coated steel specimens from each experiment were collected and analyzed for deuterium and protium with the mass spectrometer. 20 ref. (L27, ST)

169-L. Hydrophobic Films on Solid Surfaces. George J. Kahan. *Journal of Colloid Science,* v. 6, Dec. 1951, p. 571-575.

Experiments on hydrophobic films and monolayers on metal and glass. Film formation was obtained on metals with both cationic and anionic surface-active compounds; on glass, it was obtained only with cationic wetting agents. (L general)

170-L. Stress Reduction of Electrodeposited Nickel. Vincent J. Marchese. *Journal of the Electrochemical Society,* v. 99, Feb. 1952, p. 39-43.

Tests were conducted to investigate possibilities of electroforming low-stress Ni microwave plumbing. Two methods were studied: use of saccharin as an addition agent in a standard Watts bath, and superposition of a.c. on d.c. Results are tabulated and diagrammed. 12 ref. (L18, Q25, Ni)

171-L. Electrodeposition of Rhenium-Cobalt and Rhenium-Iron Alloys. L. E. Netherton and M. L. Holt. *Journal of the Electrochemical Society,* v. 99, Feb. 1952, p. 44-47.

Suitable conditions for using an ammoniacal citrate plating bath. The effects of bath composition, pH temperature, and current density on cathode current efficiency and composition of the alloy deposit. (L17, Re, Co, Fe)

172-L. The Electrodeposition of Cobalt-Tungsten-Molybdenum Alloys From Aqueous Citrate Solutions. R. F. McElwee and M. L. Holt. *Journal of the Electrochemical Society,* v. 99, Feb. 1952, p. 48-52.

Experimental procedure and results. (L17, Co, W, Mo)

173-L. Electroforming Aluminum Waveguides Using Organo-Aluminum Plating Baths. W. H. Safranek, W. C. Schickner, and C. L. Faust. *Journal of the Electrochemical Society,* v. 99, Feb. 1952, p. 53-59.

Al waveguides with twists, bends, and tapers were electroformed by electrodepositing Al on electropolished, Cu-plated, Cd-Ni alloy mandrels, followed by melting out the Cd-Ni alloy and dissolving out the Cu in HNO_3 solution. This is a new procedure for obtaining mirror-like inner surfaces on electroformed articles. 80 ref. (L18, Al, Cu, Cd, Ni)

174-L. The Effect of Indium Sulfate in Chromium Plating Baths. Norman Hackerman and Tyleen Jensen. *Journal of the Electrochemical Society,* v. 99, Feb. 1952, p. 60-63.

Addition of indium sulfate to the regular 100-to-1 Cr plating bath permitted the formation of a bright electrodeposit at 32° C. at current densities considerably above the accepted bright plating range. The deposit was more nearly crack-free than that usually formed and it was a better protective coating according to a salt-drop test. It was more adherent both to steel and to Cu than deposits formed from the regular bath in the bright range. Photomicrographs. (L17, Cr, ST)

175-L. Cathode Polarization Potential During Electrodeposition of Copper. II. Variation of the Cathode Polarization Potentials With Current Density and Electrolyte Concentration. L. L. Shreir and J. W. Smith. *Journal of the Electrochemical Society,* v. 99, Feb. 1952, p. 64-70.

Experimental procedure and results. Data are graphed and tabulated. (L17, C23, Cu)

176-L. The Effect of Chloride Ions on Copper Deposition. W. H. Gauvin and C. A. Winkler. *Journal of the Electrochemical Society,* v. 99, Feb. 1952, p. 71-77.

Results of investigation. Data are graphed and tabulated. 26 ref. (L17, Cu)

177-L. Concentration Polarization During Copper Deposition in a Convection-Free System. R. C. Turner and C. A. Winkler. *Journal of the Electrochemical Society,* v. 99, Feb. 1952, p. 78-83.

Procedure and results. Tables, diagrams, graphs, and illustrations. 14 ref. (L17, C23, Cu)

178-L. The Effects of Halides on Copper Deposition in the Presence of Gelatin. L. Mandelcorn, W. B. McConnell, W. Gauvin, and C. A. Winkler. *Journal of the Electrochemical Society,* v. 99, Feb. 1952, p. 84-88.

Results of the investigation. Graphs. 11 ref. (L17, C23, Cu)

179-L. Bearings and the Electrodepositor. O. Wright. *Journal of the Electrodepositors' Technical Society,* v. 25, 1949-50, p. 51-64.

The requirements of bimetallic bearings. Casting of these bearings and the electrodeposition techniques used. Various compositions. 23 ref. (L17, T7, SG-c)

180-L. The Influence of Surface Behaviour on the Characteristics of Electrodeposits. A. T. Steer. *Journal of the Electrodepositors' Technical Society,* v. 25, 1949-50, p. 125-146.

Fundamental principles, including the problem of examining surfaces and deposits; the mechanism of crystal growth; conditions present in metal surfaces before and after polishing; and influence of surface state on electrodeposition. Results of experiments on electrodeposition of Ni on nickel silver (12.5% Ni). Micrographs. (L17, M27, Ni, Cu)

181-L. Metal Spraying. A. R. Old. *Journal of the Oil and Colour Chemists' Association,* v. 35, Jan. 1952, p. 20-24; disc., p. 24-27.

The metal spraying process, its scope and applications. Certain practical points are mentioned with special reference to the paint industry. Value in corrosion protection, reclamation of worn parts, and decoration. (L23, ST)

182-L. Butyl Titanate in Heat Resisting Aluminium Paints. A. Hancock, and R. Sidlow. *Journal of the Oil and Colour Chemists' Association,* v. 35, Jan. 1952, p. 28-39.

The physical and chemical properties of butyl titanate. Properly formulated butyl titanate aluminum paints, when applied to steel and burned off, leave films of TiO_2 and Al which are very adherent and withstand high temperatures for a long time. (L26, Al, ST)

183-L. Araldite Surface Coating for Light Metals. P. A. Dunn. *Light Metals,* v. 15, Jan. 1952, p. 38-40.

Advantages and methods of application of the ethoxylene-resin-base lacquers for the protection of aluminum, magnesium and their alloys. (L26, Al, Mg)

184-L. Silicone Coatings Protect Metals Against Severe Service Conditions. C. E. Arnitzen and R. D. Rowley. *Materials & Methods,* v. 35, Jan. 1952, p. 82-84.

Silicone coatings with respect to heat resistance, weathering, chemical resistance, and applications. (L26)

185-L. Induction Descaling Proves a Fast, Economical Method for Cleaning Steel. Homer Kincaid. *Materials & Methods,* v. 35, Jan. 1952, p. 97.

Advantages and limitations of the process. (L10, ST)

186-L. Photographic Reproduction on Anodized Aluminium. N. I. Kirillov and A. S. Kheynman. *Metal Industry,* v. 80, Jan. 11, 1952, p. 31-33. (Translated from *Zhurnal Prikladnoi Khimii).*

Details of method by which anodic films can be made light-sensitive. (L19, Al)

187-L. Metal Cleaning and Finishing Since the War. Vernon A. Lamb. *Metal Progress,* v. 61, Jan. 1952, p. 76-80.

Progress in fundamental research and in applied and developmental work. (L general)

188-L. Technique Used in Cleaning, Coating, Printing Down Etching and Finishing Magnesium Photoengraved Plates. E. R. Owen. *Printing Equipment Engineer,* v. 82, Jan. 1952, p. 20. (L12, L26, Mg)

189-L. Phosphatizing—Versatile Substitute for Metallic Coatings. *Steel,* v. 130, Jan. 28, 1952, p. 64-66.

Advantages and applications of phosphate coatings. Includes use in wire drawing, extrusion, and other working operations. (L14, F1, ST)

190-L. Felt for Finishing: Metalworking Applications Expand. Leon D. Gruberg. *Steel,* v. 130, Feb. 4, 1952, p. 88-89, 110.

The use of felt in metalworking. Refers to cleaning, polishing, and finishing of Cr plated parts, Al, Cu, and stainless steel. Process of making, care, and use of felt wheels. (L10, Al, Cu, SS)

191-L. Differential Coated Electrolytic Tin Plate. J. J. Munns. *Steel Equipment & Maintenance News,* v. 5, Jan. 1952, p. 12-13.

See abstract in *Steel;* item 57-L, 1952. (L17, Sn, ST)

192-L. Variations As a Function of Temperature and of Applied Potential of the Electrical Resistance of Very Thin Metallic Deposits on Diamond, Amber, and Plexiglas. (In French.) Nicolas Mostovetch and Thérese Duhautois. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 233, Nov. 19, 1951, p. 1265-1267.

Electrical behavior of very thin metallic films vapor-deposited on above materials. Such films have semiconducting properties independent of the nature of the base. (L25, P15)

193-L. Recent Applications of the Technique of High-Vacuum Vapor Deposition As a Means of Metallizing Plastic Materials. (In German.) L. Hiesinger. *Kunststoffe,* v. 41, Dec. 1951, p. 444-446.

Equipment, procedure, and uses. Includes tabulated data. (L25)

194-L. Cleaning of Castings and Removing Scale By a Continuous Process Without Compressed Air. (In German.) H. Kalpers. *Sprechsaal für Keramik; Glas; Email,* v. 84, Dec. 5, 1951, p. 471-472.

Two new pieces of equipment. (L10)

195-L. Anticorrosion-Decorative Nitriding. (In Russian.) Ia. A. Shliamberg. *Legkaya Promyshlennost,* v. 11, Apr. 1951, p. 39-41.

Treatment of various steel articles as a means of conserving nonferrous metals. (L15, ST)

196-L. Method of Descaling Metallic Pieces by Means of Sodium Hydride. (In Spanish.) N. H. Gilbert. *Instituto del Hierro y del Acero,* v. 4, Apr.-June 1951, p. 182-186.

Method developed by E. I. du Pont de Nemours & Co. (L12)

197-L. Fundamentals of Aluminum Paint. Ernest Scheller. *American Paint Journal,* v. 36, Feb. 18, 1952, p. 82, 84-85, 88-89, 92-93.

Theories, fundamentals, and functions of Al paint. The pigment and its behavior in the varnish, lacquer, or synthetic solution.
(L26, T29, Al)

198-L. The Cleaning of Metals in Engineering Processes. I. B. McKenzie. *Australasian Engineer,* Dec. 7, 1951, p. 87-93.

Various mechanical and chemical methods for cleaning metals. Stresses ferrous materials. Tabulated classification of cleaning methods. 33 ref. (L10, L12, Fe)

199-L. Silicone Paint Protects High Temperature Refinery Equipment. Max Leavenworth. *Corrosion* (New Section), v. 8, Feb. 1952, p. 1.
(L26, SG-h)

200-L. Improving the Corrosion Resistance of Metal Surfaces. Allen L. Alexander. *Electrical Manufacturing,* v. 49, Feb. 1952, p. 112-115, 258, 260, 262, 264, 266, 268.

Techniques of preconditioning metal surfaces prior to application of organic finishes. (L26)

201-L. Purification of Plating Solutions by Low Current Density Electrolysis. C. E. Naylor. *Electroplating and Metal Finishing,* v. 5, Jan. 1952, p. 7-10.

See abstract from *Plating Notes;* item 795-L, 1951. (L17)

202-L. Chromium Plating. *Electroplating and Metal Finishing,* v. 5, Jan. 1952, p. 11-14.

Reviews development. (L17, Cr)

203-L. The Scope of Metal Spraying. H. J. Plaster. *Electroplating and Metal Finishing,* v. 5, Jan. 1952, p. 33-36.

The wire process of metal spraying. Included are decorative metal spraying, spraying electrical appliances and die castings. (L23)

204-L. Seven Barrels Bright Hone or Deburr 110 Different Parts. Floyd Hubbard. *Finish,* v. 9, Feb. 1952, p. 27-29, 64.

Components include stampings, castings, forgings, and screw machine products made from steel, brass, stainless, zinc, and aluminum alloys. One man operates the entire set-up.
(L10, ST, Cu, SS, Zn, Al)

205-L. Metallizing Cuts Marine Maintenance Costs. Fred M. Earle. *Iron Age,* v. 169, Jan. 31, 1952, p. 103-105.

How Al and Zn sprayed on properly cleaned iron and steel and coated with vinyl sealers are effectively protecting steel fishing boats from salt-spray corrosion. Maintenance costs are lower. Entire envelopes of ships are being sprayed during construction to protect steel hull and deck plates. (L23, ST, Al, Zn)

206-L. The Anodic Oxidation of Aluminum in Liquid Ammonia. William E. Bennett, Arthur W. Davidson and Jacob Kleinberg. *Journal of the American Chemical Society,* v. 74, Feb. 5, 1952, p. 732-735.

The behavior of Al as anode in a variety of electrolytes in liquid NH_3. Low initial valence numbers were observed only when the electrolyte contained the readily reducible nitrate ion. (L19, Al)

207-L. The Anodic Oxidation of Higher Members of the Aluminum Family in Liquid Ammonia. Albert D. McElroy, Jacob Kleinberg and Arthur W. Davidson. *Journal of the American Chemical Society,* v. 74, Feb. 5, 1952, p. 736-739.

Results of studies on Ga, In and Tl. (L19, Ga, In, Tl)

208-L. Power Brush Finishing. V. K. Charvat and R. C. Sasena. *Machine Design,* v. 24, Feb. 1952, p. 112-121.

Application of power-driven brushes to obtain unusual or more refined surface finishes. Includes a table of design factors for brushes and brushing machines. (L10)

209-L. Protective Finishes; Phosphate Coatings for Military Equipment. Part 2. Rustproofing and Protecting Friction Surfaces. Norman P. Gentieu. *Machine Design,* v. 24, Feb. 1952, p. 141-145, 222.

Finishes such as Mn and Zn phosphates and their applications in military equipment. (L14)

210-L. Copper-Clad Aluminum Can Conserve Copper in Many Uses. John L. Everhart. *Materials & Methods,* v. 35, Feb. 1952, p. 82-85

Mechanical and physical properties of Cu-clad Al. Fabrication, annealing, and joining. Various applications are given. (L22, Cu, Al)

211-L. New Protective Treatment for Aluminum Simplifies Processing at Reduced Costs. R. Stricklen. *Materials & Methods,* v. 35, Feb. 1952, p. 91-95.

General properties of Iridite #14 (Al-Coat), a chromate process for Al developed by Allied Research Products, Inc. Includes data on corrosion resistance, electrical properties, and weldability of the treated Al. Micrographs and tables.
(L14, R general, P15, K9, Al)

212-L. Surface Treatment and Plating in Naval Aircraft. Gordon S. Mustin. *Metal Finishing,* v. 50, Feb. 1952, p. 53-61, 73.

Specifications most likely to be encountered in naval aircraft work. Materials include high-strength Al alloys and various types of steel. 55 ref. (L general, Al, ST)

213-L. Report of British Metal Finishing Productivity Team on British vs. American Practices. *Metal Finishing,* v. 50, Feb. 1952, p. 62-64, 73.

Conclusions and recommendations. (L general)

214-L. Heavy Immersion Tin Plating. J. K. Wilson and O. Wright. *Metal Finishing,* v. 50, Feb. 1952, p. 69-70.

Previously abstracted from "Contact Tin Plating With a Difference," *Electroplating* and *Metal Finishing.* See item 695-L, 1951. (L16, Fe, AY, Cu, Sn)

215-L. Evaluating Metal Cleaning Efficiency. Samuel Spring. *Metal Finishing,* v. 50, Feb. 1952, p. 65-68.

Use of the water spray pattern for evaluation of partially soiled surfaces, especially as a laboratory method, although it is adaptable to plant usage. (L12)

216-L. Calculating Metal Cost for Platinum Plating. *Metal Finishing,* v. 50, Feb. 1952, p. 78.

A chart. The example shown is for calculating the cost of plating 0.006 in. of Pt on a surface area of 5 sq. ft. Lighter or heavier coatings than shown in the table can be calculated using appropriate factors. (L17. Pt)

217-L. Colourless Lacquers as Plating Reinforcements. *Metal Industry,* v. 80, Jan. 25, 1952, p. 67-69.

A discussion given by the Midlands Centre of the Institute of Metal Finishing on lacquers for protecting plated surfaces, particularly Cr plate. (L26, Cr)

218-L. Cladding of Metals. R. D. Weber. *Metallurgia,* v. 45, Jan. 1952, p. 3-6.

The principles of metal cladding, methods and processes used, and techniques of solid-phase bonding. Liquid-phase cladding, by means of continuous casting, and scrap recovery of clad metals. 10 ref. (L22)

219-L. The Protection of Metallic Surfaces by Chromium Diffusion. Part VI. Applications of Chromising. R. L. Samuel and N. A. Lockington. *Metal Treatment and Drop Forging,* v. 19, Jan. 1952, p. 27-32.

Economics of the chromizing process; efficiency of method and equipment; shape and nature of component; and processing sequence. Typical examples are of application of the process to impart corrosion and heat resistance to various steels. A combined Cr-Si-Al diffusion treatment and its potentialities. (To be continued.) (L15, ST)

220-L. Finishing Parker Pens. Thomas H. Laken. *Plating,* v. 39, Feb. 1952, p. 149-151.

Includes buffing, deburring, plating, etc. (L10, L17)

221-L. Current and Metal Distribution in Electrodeposition. II. Theoretical Considerations. John Kronsbein. *Plating,* v. 39, Feb. 1952, p. 165-170.

An elementary description of some underlying quantitative principles. Some known cases of uniform current and metal distribution and results of theoretical investigations into distribution on flat sheets and on angles. (L17)

222-L. Ceramics, Welding, Bonding Are Topics of Processing Panel. H. W. Ingalls. *SAE Journal,* v. 60, Feb. 1952, p. 28-29, 38.

Reports on a panel discussion on processing of aircraft materials held at SAE National Aeronautic Meeting, Los Angeles, Oct. 2, 1951. Ceramic coatings, welding, and metal bonding. (L27, K general, SG-h)

223-L. Paint Protection of Sewage Works Structures. W. T. McClenahan. *Sewage and Industrial Wastes,* v. 24, Jan. 1952, p. 1-23.

The various types of protective coatings available and suitable for metals used in and about sewage works. (L26)

224-L. The Mechanical Surface Finishing of Metals. G. T. Colegate. *Sheet Metal Industries,* v. 29, Jan. 1952, p. 71-78, 82; Feb. 1952, p. 163-172.

First installment of a series in which the methods considered will form part of a sequence, the final stage of which is electrodeposition, coloring, or some other form of chemical or electrochemical treatment such as anodizing. Part 1: Polishing. Part 2: The effect of various factors on ease of polishing. (To be continued.) (L10)

225-L. Electrode Deposit Fights Wear. *Steel,* v. 130, Feb. 11, 1952, p. 85.

How a tough, friction-resistant surface is applied to worn uncoiler-cone adapters by a weld-deposition procedure. This extends life by a year. Illustrated. (L24, ST)

226-L. For Better Finishes Clean Aluminum Thoroughly. *Steel,* v. 130, Feb. 11, 1952, p. 88-90, 92.

Several effective methods for cleaning Al and its alloys. Importance of good cleaning practice. (L12, Al)

227-L. (Book) **Handbuch der Metallbeizerei.** (Handbook of Metal Pickling). I. Nonferrous Metals. O. Vogel. 410 pages. 1951. Verlag Chemie, GmbH, Weinheim/Bergstrasse, Germany. 49.20 DM.

First part deals with general matters such as development of metal pickling, work layout and equipment, acid storage, disposal and treatment of waste pickle liquors, health problems involved, occupational diseases, and first-aid treatment. Second part

deals with preparation for pickling and pickling itself. (L2, EG-a)

228-L. Special Dip Routine Bans Weekend Rust. *American Machinist* v. 96, Feb. 1952, p. 143.

How surfaces of steel gears, shafts, and other parts are protected against corrosion for up to 2 months in 95% humidity conditions at Boston Gear Works. A water solution of a nitrite chemical called "VPI," and made by Shell, proved to be the answer to the problem. (L14, ST)

229-L. Hamilton Mfg. Co. Enjoys Full Operation of Metal Treatment and Finishing Plant. *Industrial Gas,* v. 30, Feb. 1952, p. 7, 25-27.

The steel finishing department. Metal preparation, finishing, and high-temperature baking of final finish. (L general, ST)

230-L. Phosphate Coatings as a Basis for Painting Steel. *Journal of the Iron and Steel Institute,* v. 170. Jan. 1952, p. 10-15.

Results obtained when analytical and performance tests were applied to industrial phosphate coatings. (L14. ST)

231-L. Tentative Analytical Tests for Phosphate Coatings on Steel. R. St. J. Preston, R. H. Settle, and J. B. L. Worthington. *Journal of the Iron and Steel Institute,* v. 170, Jan. 1952. p. 19-20.

Details of laboratory tests to determine the nature and uniformity of phosphate coatings. The tests consist of the measurement of moisture content, absorption, coating weight. hygroscopicity, and phosphate and chromate contents of the coatings. (L14, S11, ST)

232-L. For Non-Glare Surfaces: Wrinkle Paint Applied to Die Castings by Electrostatic Spray. *Precision Metal Molding,* v. 10, Feb. 1952, p. 47-49, 51.

Techniques used by Burroughs Adding Machine Co. of Detroit to obtain a uniform coating of wrinkle paint with controlled pattern. (L26)

233-L. Spray Finishing Automotive Parts Automatically. Frank L. Beonem. *Products Finishing,* v. 16, Feb. 1952. p. 20-28, 30.

Procedures at Randall Co., Wilmington, Ohio. Parts are fabricated from cold rolled or commercial deep drawn steel. (L26, ST)

234-L. Bright Dipping Brass Compacts. Marvin Rubinstein. *Products Finishing,* v. 16, Feb. 1952, p. 34-40. 42, 44, 46, 48.

Summary of procedures. (L12, Cu)

235-L. Spotlighting Finishing Progress; Properties of Chromium Plate. Allen G. Gray. *Products Finishing,* v. 16, Feb. 1952, p. 54, 56, 58, 62, 64, 68. 70, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92.

Reviews recent work on properties of Cr plate; factors affecting the quality of lacquer coatings: pickling and etching Al alloys; and mechanical finishing of Mg parts. (L general, Cr, Al, Mg)

236-L. Infra-Red Lamps at Work. Carl E. Egeler. *Products Finishing,* v. 16, Feb. 1952, p. 94-96, 98.

Advantages for baking, heating, and drying. Factors involved in design and application. (L26)

237-L. A Theory of the Mechanism of the Formation of Zinc Coatings During Galvanizing. H. Bablik, F. Götzl, and R. Kukaczka, *Sheet Metal Industries,* v. 29, Feb. 1952, p. 173-174.

Attempts to prove that the influence of chemical additions to the iron also result in a disturbance of the base metal, that is, by increasing the area of the reacting surface. (L16, CN, Zn)

238-L. Alternatives to Nickel-Chromium Plating; Report on Contributions to Birmingham Meeting of the Institute of Metal Finishing. *Sheet Metal Industries,* v. 29, Feb. 1952, p. 175-177.

Bright Zn plating, Cr on Cu, Sn-alloy plating, and colorless lacquers as plating reinforcements. (L17, Cr, Ni, Cu, Sn, Zn)

239-L. Source of Defect-Producing Hydrogen in Porcelain-Enameled Steel. *Technical News Bulletin* (National Bureau of Standards) v. 36, Feb. 1952, p. 24-25.

Previously abstracted from "Relative Importance of Various Sources of Defect-Producing Hydrogen Introduced Into Steel During the Application of Porcelain Enamels," D. G. Moore, Mary A. Mason, and W. N. Harrison. *Journal of the American Ceramic Society;* item 168-L, 1952. (L27, ST)

240-L. Crusher Parts Made Tougher by Hard Facing Using Submerged Arc Welding. *Welding Journal,* v. 31, Feb. 1952, p. 152.

Procedures used by Finning Tractor and Equipment Co., Ltd., Vancouver, B. C., in rebuilding Mn steel crusher cones and mantles. (L24, AY)

241-L. Applied Radioisotopes. *Canadian Metals,* v. 15, Feb. 1952, p. 36, 38-39.

Use of heavy hydrogen in revealing the source of H_2 which produces defects in porcelain-enameled steels. Dissolved H_2O in the frit was found to be the largest source. Work was done at National Bureau of Standards. (L27, S19, ST)

242-L. Chromium Plating; Development and Commercialisation of the Process. Part II. The Chromium Plat-

ing Solution. *Electroplating and Metal Finishing,* v. 5, Feb. 1952, p. 47-49.

Possibilities for development of radically different types of solution based on chromous, chromic, or complex Cr compounds. (L17, Cr)

243-L. Anodizing Small Parts; Special Facilities Available to Industry. *Electroplating and Metal Finishing,* v. 5, Feb. 1952, p. 54-55.

Process and layout at Scrib Ltd., Brimsdown, Middlesex, for color anodizing small Al articles of round or substantially tubular shape. (L19, Al)

244-L. Zinc Spraying: Technique and Applications in France. F. Hedde. *Electroplating and Metal Finishing,* v. 5, Feb. 1952, p. 71-72. (Condensed from *Bulletin de Documentation Technique,* Feb. 1951.)

A post-spraying technique, typical metallizing costs, and applications of Zn spraying made in certain branches of French industry. Only the wire pistol is dealt with. The principal physical characteristics of sprayed Zn coatings are summarized. (L23, Zn)

245-L. Coating Thin Sheet Metal to Be Formed Into Caps and Containers. Charles R. Bragdon. *Industrial Finishing,* v. 27, May 1951, p. 32-34, 36, 38, 40, 42, 44, 46. (Condensed from *Interchemical Review,* v. 9, Autumn 1950, p. 43-53.)

Methods and problems involved in rapidly applying and drying thin protective inside linings and decorative outside coatings to sheet metal which is later machine cut and formed into bottle caps and other forms. (L general)

246-L. Automatic Spray Painting. Part III and IV. P. C. Bardin. *Industrial Finishing,* v. 27, May 1951, p. 50-52, 54, 56, 58, 60; June 1951, p. 28-30, 32, 34, 36.

Part III describes a number of rotary-table types of automatic spraying machines. Part IV discusses electrostatic spray painting. (L26)

247-L. Durable Organic Coatings Pinch Hit for Scarce Metals. B. F. Ames. *Industrial Finishing,* v. 27, June 1951, p. 52, 54.

Research on various organic coatings as substitutes for strategic metals in the finishing of metallic parts. (L26)

248-L. Finishing Movie Film Reels. Ralph Jones. *Industrial Finishing,* v. 27, June 1951, p. 56-58.

Cleaning, phosphatizing and rinsing in wire baskets; drying by compressed air; spray painting automatically; and drying in an infrared tunnel of reels made of hard temper, cold rolled steel. (L general, ST)

249-L. Finishing the Hotpoint Automatic Washers. C. P. Nidrabsey. *Industrial Finishing,* v. 27, July 1951, p. 36-38, 40, 42.

Cleaning of metal parts, phosphatizing their surfaces, rinsing, dry-off, tack-rag wiping, dip coating and spraying prime coat, baking, sanding; then tack-rag wiping again, spraying top coat and final oven baking. (L general)

250-L. Putting a High-Class Finish on Aluminum Castings. Seymour C. Rubenstein. *Industrial Finishing,* July 1951, p. 50-52.

A method of finishing Al castings. All operations stress light coats of paint and long air drying periods. (L26, Al)

251-L. Roller Coating. P. C. Bardin. *Industrial Finishing,* v. 27, Aug. 1951, p. 12-14, 18, 20, 22, 24, 28, 30, 32.

Rapid and economical method of applying paint coatings or adhesives to thin flat panels of uniform thickness and to long ribbons of sheet metal, paper or fabric as they unwind from and wind onto large spools or reels. (L26)

252-L. Laminated Aluminum Finish Replaces Nickel-Chrome. W. A. Bartski. *Industrial Finishing,* v. 27, Aug. 1951, p. 44-46, 48.

Development of a smooth, lustrous, light-silver gray metallic finish that is baked on and will adhere perfectly to metal surfaces and which has good durability. It is suitable for many protective and decorative uses, including replacement for Ni-Cr plating. (L26, Al)

253-L. Finishing and Decorating All-Metal Furniture. Zack Logan. *Industrial Finishing,* v. 27, Aug. 1951, p. 66-68, 70.

A compact, conveyorized setup includes degreasing and bluing of steel surfaces in burn-off oven, dipping parts in synthetic enamel, baking the coating and spraying decorative lacquer through masks. (L general, ST)

254-L. Finishing Industrial Lighting Fixtures. Gilbert C. Close. *Industrial Finishing,* v. 27, Sept. 1951, p. 28-30, 32, 34, 36, 38, 40.

Conveyorized setup includes metal parts washing, a phosphate treatment, chromic acid rinse, force drying, spray painting, and oven baking. Facilities for preparation, testing, and controlling of paints and surface treating solutions. (L general)

255-L. Finishing Toledo Scale Products. R. L. McClellan. *Industrial Finishing,* v. 27, Sept. 1951, p. 60-62, 64.

Finishing operations on parts made of cold rolled sheet steel. Set-

up includes five-stage metal cleaning and rustproofing, oven dry-off, spraying a prime coat, knife glazing prime-coated castings, sanding, tack ragging and two coats of enamel, each followed by baking in an oven. (L general, ST)

256-L. Finish Line for Magnesium Products. Gilbert C. Close. *Industrial Finishing,* v. 27, Oct. 1951, p. 26-28, 30, 32, 34.

Special problems that come up when using protective coatings on magnesium die castings and the pretreatment needed to prevent oxidation of the surface. Complete cleaning, drying and painting setup. (L general, Mg)

257-L. Finishing X-Ray Apparatus. J. Lachenman. *Industrial Finishing,* v. 27, Oct. 1951, p. 36, 38, 40.

Techniques used to clean cast iron, sheet steel, and Al parts in order to receive synthetic bake finishes in off-white and gray-green hammered metallic. (L12, L26, CI, ST, Al)

258-L. Lithographing Metal Cans. T. A. Griffiths. *Industrial Finishing,* v. 27, Oct. 1951, p. 42, 44, 46, 48, 50.

Procedures used. (L26)

259-L. To Protect Equipment That's Being "Put in Moth Balls". P. C. Bardin. *Industrial Finishing,* v. 27, Oct. 1951, p. 52, 54, 56, 58.

Use of rust-preventive oils, strippable coatings, and sealed moisture-proof packages. (L26, K10)

260-L. Cleaning and Preparing Metal Surfaces for the Application of Modern Paint Coatings. P. C. Bardin. *Industrial Finishing,* v. 28, Nov. 1951, p. 18-20, 22, 24, 26, 33-34, 36, 38, 40, 42, 44, 46.

Alkali cleaning and how it is used; acid-solution cleaning, various cleaning solvents, thermal degreasing in burn-off ovens, steam cleaning, and blast cleaning. (L10, L12)

261-L. Finishing Space Heater Cabinets. Walter Rudolph. *Industrial Finishing,* v. 28, Nov. 1951, p. 51-52, 54, 56.

Procedures used by the Perfection Stove Co., Cleveland. Parts are fabricated from sheet steel. (L general, ST)

262-L. Lacquer or Baked Enamel for Pressed Metal Parts. *Industrial Finishing,* v. 28, Nov. 1951, p. 59-60, 62.

Discusses the pros and cons for each. (L26)

263-L. Finishing Ice Cream Cabinets. L. B. Kern. *Industrial Finishing,* v. 28, Dec. 1951, p. 34, 36, 38.

Operations on these cabinets include five-stage pressure spray cleaning and phosphatizing, dryoff oven, prime coat and bake, tack ragging, top coat and bake. (L general)

264-L. Finishing Several Different Products in a Small Area. Howard E. Jackson. *Industrial Finishing,* v. 28, Dec. 1951, p. 62-66.

Procedures used at the East Side Tool & Die Works, Portland, Ore. Materials of which products are made include steel, Al, brass, and Zn die castings. (L general, ST, Al, Cu, Zn)

265-L. Finishing Pease Blueprint Machines. A. R. Schreiber. *Industrial Finishing,* v. 28, Jan. 1952, p. 24-26, 28.

After cleaning the metal, a variety of operations follows, depending upon the parts and surfaces being worked on. The finishing of outer surfaces usually includes a coat of surfacer, and knife glazing where necessary, followed by drying, sanding, blowing off, tack-rag wiping, spraying hammer-effect or wrinkle finish, and oven baking at 265° F. (L general)

266-L. Production Finishing of Metal Traverse Rods. Alfred F. LaBee. *Industrial Finishing,* v. 28, Jan. 1952, p. 40-42, 44.

Vapor degreasing, handling and racking facilities and why electrostatic spray painting is so adaptable to coating these slender pressed-metal products. (L12, L26)

267-L. Wet Blast Cleaning Jet Engine Parts. *Industrial Finishing,* v. 28, Jan. 1952, p. 48-50, 52.

Procedures used at Pratt & Whitney Aircraft division of United Aircraft Corp. (L10)

268-L. Embossed Metal Signs. W. L. Schubert. *Industrial Finishing,* v. 28, Feb. 1952, p. 18-20, 22, 24.

Techniques used in applying a protective coating of baked enamel on metal traffic signs, signals, and license plates. Signs are made of 18 and 16-gage U. S. standard regular steel, or zinc-coated, rust resisting sheet steel. (L26, ST)

269-L. Descaling of Carbon Steels in Modern Merchant Mill Practice. C. S. Lambert. *Iron and Steel Engineer,* v. 29, Feb. 1952, p. 59-63; disc., p. 63-65.

Various types of scale. Removal of scale by high-pressure water. Diagrams. (L12, CN)

270-L. Nickel Plating by Chemical Reduction. I. Effect of the Basis Metal. Robert A. Powers and Norman Hackerman. *Journal of Physical Chemistry,* v. 56, Feb. 1952, p. 187-188.

Surface configuration of the supporting substance is not of major importance in inducing Ni deposition by chemical reduction either through a similarity to the Ni lattice or through catalytic activity due to surface geometry. Evaporated

films of Ni, Fe, Au, Cu, and Pt were prepared by evaporation from a heated tungsten filament and condensation onto glass microscope slides in a chamber evacuated to 5×10^{-5} mm.
(L17, Ni, Fe, Au, Cu, Pt)

271-L. Hard Surfacing Light Alloy by Anodizing. *Light Metals,* v. 15, Feb. 1952, p. 46-48. (Based on paper by W. J. Campbell.)
The "Hardas" process for Al alloys. Production information, uses, and mechanical and physical properties. (L24, L19, Al)

272-L. Some Further Observations on the Painting of Aluminium Alloys. W. A. Edwards. *Light Metals,* v. 15, Feb. 1952, p. 61-63.
Results of exterior exposure tests with respect to weathering and corrosion. (L26, R3, Al)

273-L. Hardfacing With Stellite. *Machinery* (London), v. 80, Jan. 31, 1952, p. 179-188.
Methods employed by Deloro Stellite, Ltd., Birmingham, England. Applications. (L24, Co)

274-L. Metal Fabrication by Electroforming. Alan Whittaker. *Machinery* (London), v. 80, Feb. 7, 1952, p. 240-242.
The various stages involved—master-pattern material selection, surface treatment of master, electrodeposition, and finishing. (L18)

275-L. Depositing Stellite by the Electric Arc Process. *Machinery* (London), v. 80, Feb. 7, 1952, p. 243-244.
Some applications, including a cast mild steel rotor. (L24, CN, Co)

276-L. Recent Developments in Applied Finishes for Aluminium. A. W. Brace. *Metal Industry,* v. 80, Feb. 1, 1952, p. 91-93.
Polishing, anodizing, electroplating, paint finishes, and vitreous enamel finishes. 20 ref.
(L general, Al)

277-L. Barrel Finishing. *Metal Industry,* v. 80, Feb. 8, 1952, p. 105-107.
Various types of machines used. (L10)

278-L. Pickling and Pickling Acid Inhibitors: Functions, Behaviour and Applications. Alfred Douty. *Metal Industry,* v. 80, Feb. 8, 1952, p. 108-110.
Pickling inhibition and control. Mechanism of inhibition. 15 ref.
(L12)

279-L. Phosphate Coatings. A. C. Hanson. *Metal Progress,* v. 62, Feb. 1952, p. 81.
A quick test for quality.
(L14, R11)

280-L. Enamel Coatings. P. E. Cavanagh. *Metal Progress,* v. 62, Feb. 1952, p. 83-84.
Results of tests on Inconel and 15% Cr, 35% Ni alloy saggers coated with Ferro Enamel Co.'s XS-169G in service at 2200° F. (L27, Ni)

281-L. Polishing Cermets. Clinton C. McBride. *Metal Progress,* v. 62, Feb. 1952, p. 84.
How excellent polished surfaces on TiC, TiN, and mixed carbide-base cermets were obtained using Fe_2O_3 (rouge) as a polishing agent.
(L10, C-n, Ti)

282-L. Salt Bath Quenching of High Speed Steel. Walter E. Peterson. *Metal Treating,* v. 3, Jan.-Feb. 1952, p. 5, 11.
Different procedures tried by Gorham Tool Co., Detroit (L26, TS)

283-L. The Protection of Metallic Surfaces by Chromium Diffusion. Part VII. Applications of Chromising. (Concluded.) R. L. Samuel and N. A. Lockington. *Metal Treatment and Drop Forging,* Feb. 1952, p. 81-85.
Method which can be used to advantage for improving the wear and abrasion resistance of drop forging dies, hand and machine tools, and general purpose tools. Summarizes the present position and future outlook of chromium diffusion and allied processes. (L15, T5, T7, Cr)

284-L. Report on Metal Finishing. *Paint Manufacture,* v. 22, Jan. 1952, p. 14-21; Feb. 1952, p. 51-55, 72.
Report of a visit to the U. S. A. in 1950 of a team representing the British metal finishing industry. Investigation was confined to two main classes of metal-finishing processes: painting and electroplating, including certain related processes such as metal coloring and anodizing.
(L17, L19, L26)

285-L. Reproduction of Printed Patterns by Vacuum Evaporation. E. Kafig. *Review of Scientific Instruments,* v. 23, Jan. 1952, p. 54.
A procedure for evaporating Al onto a bonding plastic, "Scotch Weld". The same technique can be applied to any surface which will accept evaporated metals. (L25)

286-L. Smooth Finish for Strip; Moving Abrasive Produces It. S. L. Johnson and R. G. Hall. *Steel,* v. 130, Mar. 3, 1952, p. 82-83.
How coated abrasive paper progressively fed over moving steel strip produces variety of finishes, cleans, and scours the surface evenly on both sides simultaneously.
(L10, ST)

287-L. The Lining of Concrete Mixer Drums With Hard Facing. F. Hildred. *Welder,* v. 20, July-Dec. 1951, p. 31-32.
Efficiency and economy achieved by the use of hard facing applied by the electric-arc welding process.
(L24, CN)

288-L. Automatic Hardfacing. M. Riddihough. *Welding and Metal Fabrication,* v. 20, Feb. 1952, p. 61-62.

The submerged-arc process for fabrication purposes and for rebuilding and hard facing of such components as steel-mill roll journals and rolls, straightening and table rolls, caterpillar-track rollers and idlers, gyratory crusher cones, etc. 13 ref. (L24, K1, ST)

289-L. Renewing Bearing Surfaces; Electrolytic Iron Saves Critical Parts. R. S. Trent. *Western Machinery and Steel World,* v. 43, Feb. 1952, p. 104-107.

Vanderloy M, an electrolytic iron and Porus-Krome, a glass-smooth, diamond-hard plating that retains oil. Processes involved. Micrographs. (L17, SG-c, Fe, Cr)

290-L. South American Wire Galvanizing Plant. *Wire Industry,* v. 19, Feb. 1952, p. 135-138.

Production at an unidentified plant; surveys the situation and makes suggestions for improving technique. (L16, CN, Zn)

291-L. Plating High-Tensile Steels; Some Notes on Methods of Pretreatment and Electrodeposition. H. Cann and H. F. Henley. *Aircraft Production,* v. 14, Mar. 1952, p. 87-88.

Mechanical and chemical methods of scale removal, techniques on selective plating, and heat treatment after plating. (L17, J general, ST)

292-L. Ceramic Coatings. *Aircraft Production,* v. 14, Mar. 1952, p. 107-108.

A ceramic coating "A-417" developed by U. S. National Bureau of Standards in the U. S. is composed of a high-barium, alkali-free frit (glass) with a 30% admixture of chromic oxide. Applications. Data are tabulated. (L27)

293-L. Spray and Sinter to Make High Temperature Alloy Parts. James E. Cline, Robert T. Thurston, and John Wulff. *American Machinist,* v. 96, Mar. 3, 1952, p. 172-175.

Technique by which thin-walled bodies of rotational symmetry impossible to produce by other means can be produced by metal spraying, followed by sintering in a reducing atmosphere. (L23, H15, SG-h)

294-L. The Preparation of Metallic Surfaces for the Application of Coatings. S. M. Anderson. *Australasian Engineer,* Jan. 7, 1952, p. 68-70.

(L general)

295-L. On the Mechanism of Electrolytic Polishing of Metals. W. J. McG. Tegart and R. G. Vines. *Australasian Engineer,* Jan. 7, 1952, p. 70-72.

Various theories. Proposes a single unifying hypothesis. (L13)

296-L. Electrolytic Polishing; a Process for Treating Stainless Steels and Irons. *Automobile Engineer,* v. 42, Feb. 1952, p. 56.

In the Electropol process, the work is the anode. When current is passed, metal is removed from the outer surface of the work. Applications. (L13, SS, Fe)

297-L. How to Save Nickel in an Enamel Plant by Lengthening Bath Life. *Ceramic Industry,* v. 58, Mar. 1952, p. 61.

Converting colloidal iron created in the nickel dip to particles of suitable size for filtering prolongs bath life. Claims that this process will save thousands of dollars annually in many enameling plants. (L27, Ni)

298-L. Refinery Painting. W. B. Cook. *Corrosion* (Technical Section), v. 8, Mar. 1952, p. 93-99.

Selection of surface-preparation methods and paint coating systems to provide the best economic results for protection, decorative effect, and other benefits to be derived from the application of paints and coatings to surfaces exposed to specific refinery conditions. (L26)

299-L. Production Enameling on Small Items. Walter Rudolph. *Finish,* v. 9, Mar. 1952, p. 37-39.

How Erie Ceramic Arts Co., Erie, Pa., coats small metal and glass parts. (L27)

300-L. Painting Castings Electrostatically. *Foundry,* v. 80, Mar. 1952, p. 240, 242.

Principle and method as applied at Textile Machine Works, Foundry Div., Wyomissing, Pa. (L26)

301-L. Application of Dilatometric Analysis to the Problem of Enamelling Cast Iron. Auguste Le Thomas and Pierre Tyvaert. *Foundry Trade Journal,* v. 92, Feb. 7, 1952, p. 151-155.

In borderline cases, selection of enamels with suitable expansion ranges, as revealed by the tests described, may make the difference between success and failure of the coating. (L27, CI)

302-L. Savings by the Barrel. Charles O. Furbish. *General Electric Review,* v. 55, Mar. 1952, p. 40-43.

The tumbling process for deburring, smoothing, shaping and other surface finishing operations. (L10)

303-L. Ultrasonic Cleaning of Small Parts. George E. Henry. *General Electric Review,* v. 55, Mar. 1952, p. 60-61.

A method of removing oil, grease, chips, dirt, lapping compounds, and many other contaminants from the surfaces of small precision workpieces at a rate hitherto unattain-

able, and to a degree of cleanliness that usually surpasses the most stringent industrial standards. (L10)

304-L. On the Role of Nickel in Porcelain Enameling. J. H. Keeler, P. K. Chu, and H. M. Davis. *Journal of American Ceramic Society*, v. 35, Mar. 1, 1952, p. 72-75.

Nickel applied to sheet steel as a Ni flash endures in the surface through several de-enamelings and re-enamelings. The attendant improvement in the enameling behavior of the steel is similarly persistent. Heat treating experiments with and without Ni lead to the conclusion that, while the fired assembly is cooling, nickel oxide at the interface is reduced by H_2 from the steel, forming water which enters the enamel and diminishes the hydrogen available for defect production. 17 ref. (L27, ST, Ni)

305-L. Phosphate Coating vs. Galvanising. John H. Lawrence. *Machinery Lloyd* (Overseas Ed.) v. 24, Feb. 16, 1952, p. 105-106.

Comparative values obtained by salt-spray and actual weathering tests. Impact and distortion tests were also made. Graph presents corrosion resistance data.
(L14, L16, R3, Q6, ST, Zn)

306-L. Plating Hints; Correct Maintenance of Electrical Installations. T. M. Rodgers. *Metal Industry*, v. 80, Feb. 22, 1952, p. 147-148.
(L17)

307-L. The Coating of Steel With Aluminium. D. P. Moses, and G. G. Popham. *Metallurgia*, v. 45, Feb. 1952, p. 70-74, 84.

Reviews principal methods for application of Al coatings to steel. Micrographs. 32 ref.
(L general, Al, ST)

308-L. Relative Importance of Various Sources of Defect-Producing Hydrogen Introduced Into Steel During Application of Vitreous Coatings. Dwight G. Moore, Mary A. Mason, and William N. Harrison. *National Advisory Committee for Aeronautics*, Technical Note 2617, Feb. 1952, 31 pages.

Previously abstracted from *Journal of the American Ceramic Society*. See item 168-L, 1952. (L27, ST)

309-L. Solid Films on Electropolishing Anodes. T. P. Hoar and T. W. Farthing. *Nature*, v. 169, Feb. 23, 1952, p. 324-325.

Evidence of the presence of a solid film (dissolving at its outer service as fast as it is formed anodically from the metal) during the electropolishing of Cu and α-brass anodes in a 50/50 by volume orthophosphoric acid/water bath.
(L13, Cu)

310-L. A Survey of Special Purpose Coatings. Edward Engel. *Organic Finishing*, v. 13, Feb. 1952, p. 11-13, 16.

Wrinkle finishes, polychrome metallic finishes, flock, luminous paints, decals or transfers, and stencil-finishing. Behavior on metal surfaces. (L26)

311-L. Metallizing for Decorative Purposes. Ernest Mueller. *Organic Finishing*, v. 13, Feb. 1952, p. 17-18.

A double barreled spray gun for simultaneously spraying Ag and reducer solutions. (L23, Ag)

312-L. Some Characteristics of Zinc Cyanide Plating Solutions. II. Haring Cell Throwing Power. Gustaf Soderberg. *Plating*, v. 39, Mar. 1952, p. 255-256, 260.

Results of an investigation. (L17)

313-L. Barrel Finishing. II. Selection of Equipment. Morris S. Shipley. *Plating*, v. 39, Mar. 1952, p. 257-260.

Points to consider in equipping a barrel-finishing department for efficient operation. (L10)

314-L. Tentative Recommended Practice for Preparation of and Plating on Aluminum Alloys. *Plating*, v. 39, Mar. 1952, p. 265-266.

(To be continued.) (L17, Al)

315-L. The Hot-Dip Galvanizing of Structural Steel Sections. R. A. Painter. *Proceedings of Institution of Electrical Engineers*, v. 99, pt. 2, Feb. 1952, p. 39-46.

Brief description of the metallurgical structure of a Zn coating, together with some information on its expected life. A condensed description of the process, and of certain methods of quality control. Advice on maintenance of the finished product. (L16, M27, CN, Zn)

316-L. Phosphate Coatings for Military Products. Norman P. Gentieu. *Product Engineering*, v. 23, Feb. 1952, p. 183-190.

A review of the types of phosphate coatings being specified by the armed services for protection of metal surfaces. Tabulated list of specifications. (To be continued.)
(L14)

317-L. Tool Joints Hard-Faced. Fred M. Burt. *Welding Engineer*, v. 37, Mar. 1952, p. 28-29.

The advantages of hard facing with tungsten carbide.
(L24, W, C-n, Ts)

318-L. Metallizing a Viaduct. W. C. Henzlik. *Welding Engineer*, v. 37, Mar. 1952, p. 40-42.

Process whereby sprayed Al is given an overcoating of a special Al vinyl plastic to provide 20-50 years of protection for newly built steel bridges and viaducts.
(L23, L26, T26, Al, CN)

319-L. Absolute Determination of the Condensation Factors of Molecular Jets of Antimony on a Surface. (In French.) Marcel Devienne. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Jan. 2, 1952, p. 80-81.

Determined on the basis of the relation between the value of the radioactivity of a thin layer of Cu on a condensation plate and the sum of the radioactivity of this deposit and condensations on the lateral surface of a metallic cylinder and on a reflection plate. Includes diagram. (L25, Sb)

320-L. Intervention of Specificity in the Formation of Metallic Deposits on Glass. (In French.) Jean Loiseleur. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Jan. 2, 1952, p. 162-164.

Formation of a metallic deposit on glass was found to require previous preparation of the surface, consisting in formation of a nonmolecular layer by treatment with a very dilute solution of the metal to be deposited. The presence of this layer is said to impose a specificity comparable to the adaptation of an antibody to its antigen. That is, a deposit of a particular metal cannot usually be formed if the surface treatment was with a solution of a different metal. Results for Cu, Au, and Rb are tabulated.
(L general, Cu, Au, Rb)

321-L. Notes Concerning Welding-on of Gear Teeth. (In Czech.) Josef Nemec. *Hutnické Listy,* v. 6, Dec. 1951, p. 586-589.

Problems connected with the use of welded (built-up) gear teeth in coal-mining equipment. Materials deposited. (L24, ST)

322-L. Some Remarks on the Subject of Zinc Replacement. (In French.) A. Gordet. *Métallurgie et la Construction Méchanique,* v. 83, Dec. 1951, p. 1011, 1013-1015.

Replenishment of the Zn content of galvanizing baths with secondary Zn. Results of a survey of factors affecting the galvanizing process and quality of the products.
(L16, Zn, CN)

323-L. Determination of the Electrical Characteristics of the Anodic Oxide Film on Aluminum. (In Italian.) W. Ruff. *Alluminio,* v. 20, Dec. 1951, p. 540-552.

Circuit diagrams of an apparatus developed to determine the current present just before perforation of the film. It was found that electrical behavior is not improved by increased oxidation time; that advantages of sealing with Ni and Co acetate appear only after 1 month, and require an oxidation time of at least 25 min.; and that the sealing effect varies with composition of the Al and is better in 95% Al soft sheets than in hardened ones. Data are charted and tabulated. 11 ref.
(L19, P15, Al)

324-L. Repairing Cast Iron Cylinders for Rolling Mills by Means of Cast Material. (In Italian.) R. Rolla and A. Colle. *Metallurgia Italiana,* v. 44, Jan. 1952. p. 6-8.

The repair was carried out by washing the surface to be welded with molten cast iron, then machining to necessary dimensions. Application to repair of 17-30-in. diam. cylinders weighing 2-4 tons. Includes weld photomicrographs. (L24, CI)

325-L. Rust Protection (in Industrial Coating Practice). (In German.) Otto Gerhardt. *Werkstoffe und Korrosion,* v. 2, Dec. 1951, p. 444-446.

Need for renewing the paint on weather-exposed iron and steel structures in Germany. Various passivating undercoatings and topcoats, properties of suitable pigment binders, and the most recent development in silicone and fluorohydrocarbon coatings. (L26, Fe, ST)

326-L. Protection of Iron by Painting. (In German.) Manfred Ragg. *Werkstoffe und Korrosion,* v. 3, Jan. 1952, p. 11-17.

Properties and qualities of different paints and paint ingredients as protective coatings. Data are tabulated. (L26, Fe)

327-L. Strength of Surface Coatings. Henry Grinsfelder. *American Paint Journal,* v. 36, Mar. 24, 1952, p. 66-68, 70, 72, 74-79.

Some of the strength properties of film surfaces and film bodies were determined. Shows how these properties change as time of loading varies. (L26)

328-L. Metal-Finishing by Vacuum Evaporation; A Commercial Method for Finishing Jewelry. *Chemical Age,* v. 66, Mar. 1, 1952, p. 349-351.

Method developed by a British organization, and its applicability to various base metals and deposited metals. (L25)

329-L. Water Resistance of Coatings Containing Nitrogenous Resins. Henry Grinsfelder. *Industrial and Engineering Chemistry,* v. 44, Mar. 1952, p. 563-568.

Results of a study undertaken to determine the effect of the nitrogen resin, the alkyd resin, the curing conditions, and the pigment on the water resistance of baked finishes applied to metal surfaces. (L26, R4)

330-L. Some Contributions of the Petroleum Chemical Industry in the

Surface Coatings Field. R. N. Wheeler. *Journal of the Oil & Colour Chemists' Association,* v. 35, Mar. 1952, p. 107-117.

Chemical reactions for various processes. Applications of epichlorohydrin resins in can coatings, wire enamels, and coatings for Al and light alloys. (L26)

331-L. Cleaning Work by Using Ultra High-Frequency Sound Waves. Charles R. Fay. *Machinery* (American), v. 58, Mar. 1952, p. 158-161.

How grease, oil, and fine particles of embedded dirt and lapping compound are quickly and easily removed from the precision metal shaving heads of Schick electric shavers by ultrasonic methods. (L10)

332-L. Metal Fabrication by Electroforming. Alan Whittaker. *Machinery* (London), v. 80, Feb. 28, 1952, p. 362-366.

Advantages and limitations of the graphite-coating, metal-powder, silver-reduction, and vacuum-sputtering methods of producing conductive layers on various types of surfaces. (L general)

333-L. Barrel Finishing at Eureka-Williams. Joe Reinholz. *Metal Finishing,* v. 50, Mar. 1952, p. 52-53, 62.

Finishing of numerous components fabricated by or purchased for use in vacuum cleaners or oil burners. (L10)

334-L. The Role of Chelating Agents in the Plating Industry. Harold Narcus. *Metal Finishing,* v. 50, Mar. 1952, p. 54-62.

The more familiar sequestering agents, the commercial chelating agents, and a comparison between the two. The present applications of chelating agents in the metal-finishing field. 13 ref. (L17)

335-L. Chemical Analysis and Control of Alkaline Metal Cleaners. K. E. Langford. *Metal Finishing,* v. 50, Mar. 1952, p. 66-71, 74.

Some control methods which can be used for various compositions and for proprietary cleaners of unknown composition. (L12)

336-L. Sprayed Aluminium-Base Coatings for Aluminium Alloys. F. A. Champion. *Metal Industry,* v. 79, Oct. 26, 1951, p. 355-358; Nov. 2, 1951, p. 384-385.

Laboratory salt-spray tests have shown that sprayed Al coatings provide a practical means of raising the corrosion resistance of Al alloy extrusions and castings which contain Cu as a major alloying constituent to the high level of clad strong alloy plate and sheet. For Al-Cu alloys, coatings of 99.5% purity provide adequate protection. Further work is required to develop a technique for spraying satisfactory coatings of higher purity. Application of the principle to other alloys, and the composition of appropriate coatings. (L23, Al)

337-L. A Study of Primers for Ferrous Metals in an Atmospheric Exposure. T. A. Dembski. *Official Digest,* Dec. 1951, p. 879-884; disc., p. 885.

Previously abstracted from *American Paint Journal,* (Convention Daily). See item 770-L, 1951. (L26, ST)

338-L. How One Company Handles Refinery Painting. W. B. Cook. *Petroleum Refiner,* v. 31, Mar. 1952, p. 128-133.

See abstract "Refinery Painting", *Corrosion* (Technical Section); item 298-L, 1952. (L26)

339-L. What Electroforming Offers the Designer of Precision Parts. A. G. Buschow. *Precision Metal Molding,* v. 10, Mar. 1952, p. 39-40, 65-66.

Metals used and typical applications. (L18)

340-L. Simple Aluminum Coloring Technique Is Suitable for Common Die Cast Alloys. *Precision Metal Molding,* v. 10, Mar. 1952, p. 53.

New process called "Alumox 44" permits the use of such colors as yellow, blue, green and brass on cast or wrought Al alloys. (L14, Al)

341-L. Black Anodizing of Aluminum Die Castings is a Production Operation. K. W. McCrea. *Precision Metal Molding,* v. 10, Mar. 1952, p. 51-53.

Processes used. (L19, Al)

342-L. Electroplating, Metallic and Clear Lacquers Utilized in Casket Finishing. Ezra A. Blount. *Products Finishing,* v. 16, Mar. 1952, p. 18-24, 26.

Operations employed by the Belmont Casket Mfg. Co., in the plating of steel and Zn-base die castings. Various finish effects are created with colored, clear, or translucent lacquers. (L17, L26, Zn, ST)

343-L. The Hot Spray Method of Finishing Passenger Car Bodies. J. B. Wiesel. *Products Finishing,* v. 16, Mar. 1952, p. 26, 28, 30, 32, 34, 36.

Development of suitable lacquers as automobile finishes. Advantages offered in the use of lacquers. Advantages of the hot-spray method of application. (L26)

344-L. Plating to Meet Today's Conditions. Myron B. Diggin. *Products Finishing,* v. 16, Mar. 1952, p. 38-40, 42, 44, 46, 48.

Various finishing methods and the alterations made due to current shortages of needed metals such as Ni, Cu, Sn, and Cd. (L17)

345-L. Spotlighting Finishing Progress. Allen G. Gray. *Products Finishing*, v. 16, Mar. 1952, p. 56, 58, 60, 62, 66, 68, 72, 74, 76, 78, 80, 82, 84.

Surveys recent studies on impurities in Ni-plating baths and on finishing Mg for assembly protection. (L17, L general, Ni, Mg)

346-L. Methods of De-Enamelling Vitreous-Enamelled Components. W. H. Billingham. *Sheet Metal Industries*, v. 29, Mar. 1952, p. 269-272.

De-enameling with caustic-soda solution, the molten caustic method, de-enameling by shot-blasting, and de-enameling by acid. (L12)

347-L. Modern Developments in Metallizing. Sam Tour. *Welding Journal*, v. 31, Mar. 1952, p. 199-206.

Modern developments in metal spraying and in sealing or impregnating the porous metal coatings to make them more resistant and impervious to corrosion. Mechanical properties and corrosion protection. (L23, Al, Cu, SS, Cn, Ni, Sn, Zn)

348-L. Some Remarks on the Subject of Zinc Replacement in Hot Galvanizing. (In French.) A. Gordet. *Métallurgie et la Construction méchanique*, v. 83, Jan. 1952, p. 53, 55-56.

Industrial tests, various working methods, bath compositions, etc. (L16, Zn)

349-L. Advantages of Chromium Plating in Combustion Engines. (In French.) G. Mohr. *Métallurgie et la Construction mécanique*, v. 84, Feb. 1952, p. 117, 119-120.

Experiments on various parts. (L17, Cr, ST)

350-L. A Cause of Warping of Sheets During Enameling. (In German.) A. Dietzel and E. Wegner. *Berichte der Deutschen Keramischen Gesellschaft e. V., und des Vereins Deutscher Emailfachleute e. V.*, v. 28, Nov. 1951, p. 642-649.

It is shown experimentally that sheet metals enameled on one side warp because of the sudden expansion upon passing the Ar_3 point. Good behavior of sheet containing Ti, and factors to be observed in spraying the sheet with a thin layer of base enamel. Photographs, graphs, and tables. (L27, ST)

351-L. Coating an Ingot-Steel Roll With Hard PVC. (In German.) Jakob Bernhard. *Kunststoffe*, v. 42, Feb. 1952, p. P13-P14.

Process used to provide corrosion resistance required for certain applications. (L24, CN)

352-L. Testing Methods for Nickel Electroplating Baths and Nickel Coatings. (In German.) J. Elze. *Metall*, v. 6, Jan. 1952, p. 5-11.

Various testing methods (on the basis of the literature) for adhesive strength, porosity, hardness, etc. The importance of internal stresses in the material to be plated, also other factors. Diagrams, micrographs, and 12 ref. (L17, Ni)

353-L. Lacquer Coating on Aluminum. Max Schenk. (In German.) *Metall*, v. 6, Mar. 1952, p. 136-138.

Various methods by which lacquers of different composition can be made to adhere to an Al surface, particularly by an anodic pretreatment developed by the author. Tests of this and photographs. (L19, L26, Al)

354-L. Improvement of Surface Quality of Ground Workpieces by Electrolytic Polishing and Its Relationships to Mechanical Properties. (In German.) J. Heyes. *Metalloberfläche*, ser. B, v. 3, Dec. 1951, p. B177-B179.

Reports of experiments on electropolishing of carbon and alloy steel crankshafts. Investigation shows that the process can also be applied successfully to larger workpieces. Results are tabulated, charted, and illustrated by micrographs. (L13, CN, AY)

355-L. Comparative Investigation of Polishing With a Phosphoric Acid-Sulfuric Acid and an Acetic Acid-Perchloric Acid. Electrolyte. (In German.) J. Heyes. *Metalloberfläche*, ser. B, v. 3, Dec. 1951, p. B179-B181.

Results of experiments on application of above solutions to electropolishing of a 0.35% C steel are tabulated and charted. (L13, CN)

356-L. Electrolytic Brass Coatings. (In German.) O. Kramer. *Metalloberfläche*, ser. B, v. 3, Dec. 1951, p. B181-B183.

Practical requirements for successful electrolytic brass plating, such as composition of the bath, temperature, current, voltage; as well as causes of various defects. (L17, Cu)

357-L. Grinding and Polishing Agents. (In German.) W. Burkart. *Metalloberfläche*, ser. A, v. 6, Jan. 1952, p. A1-A4.

Properties, hardness, chemical composition and specific uses. Photomicrographs show structures of some of the more commonly used agents. (L10)

358-L. Electrolytic Deposition of Tin Alloys. (In German.) Edmund R. Thews. *Metalloberfläche*, ser. B, v. 4, Jan. 1952, p. B5-B6.

Composition and conditions of electroplating Sn-Pb alloys. (L17, Sn, Pb)

359-L. Palladium Deposits. (In German.) R. Erdmann. *Metalloberfläche,* ser. B, v. 4, Jan. 1952, p. B6-B7.

Review of literature and patents includes discussion of composition and plating conditions. (L17, Pd)

360-L. Patina Production on Objects of Art. (In German.) K. Stark. *Metalloberfläche,* ser. B, v. 4, Jan. 1952, p. B7-B8.

Procedure for producing an antique patina on vases, dishes, busts, etc., made of silver, gold, copper, or brass. (L14, Ag, Au, Cu)

361-L. The Dip-Grinding Process. (In German.) G. Hermes. *Metalloberfläche,* ser. B, v. 4, Jan. 1952, p. B8-B10.

The high cost of hand polishing and the inadequacy of hydropolishing. Design and operation of a dip-grinding machine. (L10)

362-L. Difficulties Encountered During Barrel Galvanizing. (In German.) Otto Niedermeyer. *Metalloberfläche,* ser. B, v. 4, Jan. 1952, p. B10-B11; Feb. 1952, p. B24-B25.

Improved methods of degreasing, pickling, and galvanizing for greater resistance to corrosion. (L12, L16, CN, Zn)

363-L. Modern Electrolytic Degreasing. (In German.) A. Pollack. *Metalloberfläche,* ser. A, v. 6, Feb. 1952, p. A27-A28.

Most important properties of good electrolytic degreasing bath. (L13)

364-L. Welded Deposited Coatings on Streetcar Rails. (In German.) G. Krüger. *Schweissen und Schneiden,* v. 4, Feb. 1952, p. 50-55.

Technological and metallurgical means for increasing the crack and wear resistance of rails. Use of killed "M steel" and austenitic 18-8-6 electrodes for certain types of rails. Electrode development, thermal expansion, internal and superficial stresses, and types of current applied. Micrographs and schematic diagrams. (L24, Q9, CN)

365-L. New Technology of Electric-Arc Hard Surfacing Cutting Tools. (In Russian.) G. P. Ivanov. *Stanki i Instrument,* v. 22, May 1951, p. 20-22.

A machine for applying a hard coating to cutting tools was developed. Tests were made under various conditions. The equipment and test results. (L24, ST)

366-L. Does the Gamma Phase of Iron Exist in Vapor-Deposited Coatings? (In German.) Hans König. *Zeitschrift für Metallkunde,* v. 43, Jan. 1952, p. 26-28.

Reports on experiments. At room temperature, there is no evidence of a γ-phase of Fe in such layers. 10 ref. (L25, M26, Fe)

367-L. Liquid Abrasive Machining. (In Russian.) N. I. Goraetskii. *Stanki i Instrument,* v. 22, July 1951, p. 27-31.

Problems connected with the design and use of liquid abrasive machining. Experimental machine is diagrammed. Data charted. (L10)

368-L. Electrolytic Brass Plating From Non-Cyanide Solutions. (In Russian.) A. I. Stabrovskii. *Zhurnal Obshchei Khimii,* v. 21(83), July 1951, p. 1223-1229.

Experiments were made on the deposition of Cu-Zn alloys from a series of solutions (chlorides, thiosulfates, alkaline solutions with glycerine, etc.) which did not contain cyanides. Results are tabulated and charted. (L17, Cu, Zn)

369-L. Degreasing in the Plating Shop; Plant and Technique Which Make for Better Cleaning at Lower Cost With Reduced Trichlorethylene Consumption. W. F. Jesson. *Electroplating and Metal Finishing,* v. 5, Mar. 1952, p. 77-84. (L12)

370-L. Relationships Between Color, Type of Alkali Ions and Adherence of Ground Coats Containing Cobalt Oxide. H. C. Marshall and R. M. King. *Finish,* v. 9, Apr. 1952, p. 20-21, 54.

Refers to enameling of sheet iron. Data are charted and tabulated. (L27, ST)

371-L. Conservation in Enameling Operations. Evan Oliver. *Finish,* v. 9, Apr. 1952, p. 34-35, 38, 68-71.

Suggestions for conserving labor and materials and practical information on reworking of rejected parts. (L27, ST)

372-L. Hard Chrome Plate in Maintenance. Gilbert C. Close. *Finish,* v. 9, Apr. 1952, p. 25-28, 71-73.

See abstract of "Chromium Plating: New Life for Worn Parts", *Steel;* item 389-L, 1952. (L17, Cr, ST)

373-L. Painting Aluminum Awning. Sidney H. Glickman. *Industrial Finishing,* v. 28, Mar. 1952, p. 26-28.

Surface preparation and other processes used at KoolVent Metal Awning Co., Chicago. (L26, Al)

374-L. Hot Lacquer Painting of Army Convertibles. Walter Rudolph. *Industrial Finishing,* v. 28, Mar. 1952, p. 56-58, 60, 62.

Some features of the painting facilities at Twin Coach Co., Kent, Ohio. (L26, CN)

375-L. Flock Coating Auto Seat Springs. *Industrial Finishing,* v. 28, Mar. 1952, p. 66-68, 70.

Process at the L. A. Young Spring & Wire Corp. (L26, CN)

376-L. To Conserve Copper—New Method Tested for Cladding Bullet Jackets. Sam Tour. *Iron Age,* v. 169, Mar. 27, 1952, p. 108-110.

New method for cladding Cu to steel has been tested, but is not yet in commercial production. Molten Cu or gilding metal is poured onto a steel slab with the aid of a methyl borate flux. Welded-on side walls hold the metal on the steel slab until it solidifies. Then the composite is rolled out. Tests indicate an excellent bond between the two metals. (L24, Cu, ST)

377-L. Caustic Etch Treats Aluminum Without Sludge or Scale. R. J. Stell. *Iron Age,* v. 169, Apr. 3, 1952, p. 138-139.

Formation of sludge and scale in caustic treatment of Al has been virtually eliminated with a new caustic etching product. Dissolved Al remains in solution as sodium aluminate, rather than being deposited as alumina on tank walls and heating coils. Tanks are easily cleaned by hosing. More consistent finishes are reported. (L12, Al)

378-L. An Introduction to Clad Metals. Walter L. Keene. *Iron and Steel Engineer,* v. 29, Mar. 1952, p. 109-118; disc., p. 118-119.

Characteristics, and principles and methods of bonding. Extensive list of U. S. patents on composite and clad metals. Diagrams. (L24)

379-L. Low Cost Black Oxide Finish Produced on Steel by Chemical Dip Method. A. J. Mitchell. *Materials & Methods,* v. 35, Mar. 1952, p. 92-95.

Attractive, durable, and corrosion resistant finish suitable for a variety of applications, including machine parts, bearings, gages, aircraft engine components, and similar products. (L14, ST)

380-L. Diffusion as a Cause of Porosity. *Metal Industry,* v. 80, Mar. 14, 1952, p. 213.

Experiments using Cu, Al, Ni, Zn, and Sn in electroplating in an attempt to explain displacement of the interface and porosity in the diffusion zone.
(L17, N1, Cu, Al, Zn, Ni, Sn)

381-L. White Brass Plating—One Solution to the Nickel Freeze. Webster B. Knight. *Metal Progress,* v. 61, Mar. 1952, p. 61-64.

Results of investigations made to determine practicable alternatives for Ni in automotive plating. Five methods—advantages and drawbacks, emphasizing the white-brass, Cr-flash method. Cu-Zn constitution diagram. (L17, Zn, Cu, Cr, Ni)

382-L. Perchloric Acid Hazard. E. Knuth-Winterfeldt. *Metal Progress,* v. 61, Mar. 1952, p. 80.

Precautionary measures for safety when using perchloric acid in electropolishing. (L13)

383-L. Polishing Tantalum. G. W. Wensch, K. B. Bruckart, and M. Conolly. *Metal Progress,* v. 61, Mar. 1952, p. 81.

Details of electropolishing technique and solution. (L13, Ta)

384-L. Factors Influencing Structure of Electrodeposits. *Metal Progress,* v. 61, Mar. 1952, p. 106. (Condensed from "The Structure of Electrodeposits", by J. J. Dale.)

Discusses and classifies structure of electrodeposits and the factors affecting their growth. (L17, M27)

385-L. Chromium Impregnation of Carbon Steel. *Metal Progress,* v. 61, Mar. 1952, p. 118, 122.

See abstract of "Mechanism and Kinetics of the Chromizing of Mild Steel in Atmospheres Containing Chromous Chloride", T. P. Hoar and E. A. G. Croom, *Journal of the Iron and Steel Institute;* item 11-L, 1952. (L15, CN)

386-L. Stains on Aluminum-Sprayed Steel Surfaces. *Metal Progress,* v. 61, Mar. 1952, p. 150, 154, 156.

See abstract of "The Protection of Steel by Sprayed Aluminum", by W. E. Ballard, *Electroplating and Metal Finishing;* item 85-L, 1952. (L23, Al, ST)

387-L. The Hydride Aluminum Plating Bath. *Modern Metals,* v. 8, Mar. 1952, p. 24.

New Al plating technique, employing a hydride plating bath. The new bath consists of an ethereal solution of Al chloride and a metal hydride. (L17, Al)

388-L. Mobile Drum Cleaning Plant. George Grupp. *Organic Finishing,* v. 13, Mar. 1952, p. 24-25.

Installation developed by U. S. Army Quartermaster Corps for cleaning and reconditioning cans and drums. Includes wire-brushing equipment. (L10, L12, ST)

389-L. Chromium Plating: New Life for Worn Parts. *Steel,* v. 130, Mar. 31, 1952, p. 76-77.

Procedures and applications for hard Cr plating of gages, worn bearing surfaces, and cutting tools when wear threatens to end their useful life. (L17, Cr, ST)

390-L. Possibilities in Porcelain Enameled—Coated Steels Conserve Scarce Alloys. Edward Mackasek. *Steel,* v. 130, Apr. 7, 1952, p. 116-117.

Porcelain-enamel researchers report coatings that have high resist-

ance to temperature, corrosion, thermal shock, severe abrasion, and a low coefficient of friction. (L27)

391-L. Washer-Tumbler Speeds Cleaning, Deburring. *Steel,* v. 130, Apr. 7, 1952, p. 117.

Unit is a combined washer and tumbling barrel whose perforated steel drum in 40 in. in diam. (L10)

392-L. Electroforming Produces Intricate Shapes to Close Tolerances. Charles L. Faust and William H. Safranek: *Tool Engineer,* v. 28, Apr. 1952, p. 37-40.

The process, costs, properties, and applications of electroformed metals. (L18)

393-L. Metallic Coatings. W. W. Bradley. "Encyclopedia of Chemical Technology. Vol. 8" (Interscience Encyclopedia, New York), 1952, p. 898-922.

Reviews the various processes and principal materials involved. 35 ref. (L general)

394-L. Electropolishing and Chemical Polishing of Aluminum. (In German.) H. Hug. *Aluminium Suisse,* v. 2, Jan. 1952, p. 4-13.

The processes and their application in Switzerland and various patents pertaining to them. Colored photographs show decorative applications. Various bath compositions. (L13, L10, Al)

395-L. The Action of Pickling Inhibitors. (In Italian.) Antonio Indelli and Giampaolo Bolognesi. *Metallurgia Italiana,* v. 44, Feb. 1952, p. 73-77.

Gas-analysis data on the action of allyl isothiocyanate at 25 and 60° C. The action of this reagent as a function of acid concentration was determined. An evaluation was made of efficiency of the pickling inhibitor both with respect to economy in iron and acid and of corrosion resistance of the surfaces obtained. Tables and charts. 33 ref. (L12, Fe, ST)

396-L. The Problem of the Change of Acidity in the Cathode Region (Catholyte) During Electrodeposition of Metals. (In Russian.) S. I. Berezina and G. S. Vozdvizhenskii. *Zhurnal Prikladnoi Khimii,* v. 24, Aug. 1951, p. 832-839.

The pH values were measured by means of Pt-H_2 electrodes. Data on variations of pH with H+ ion concentration, current density, and different concentrations of various acids and salts are charted. (L17)

397-L. Electrode Potentials During Electrolysis of Salts of Various Metals With Mercury Electrodes. (In Russian.) P. P. Tsyb and M. T. Kozlovskii. *Zhurnal Prikladnoi Khimii,* v. 24, Aug. 1951, p. 840-850.

Determined experimentally for salts of Sn and Cd. Dependence of electrode potentials on metal concentration and acidity of the electrolyte was established for various conditions. Data are tabulated and charted. (L17, Sn, Cd)

398-L. Electrolysis of Zinc Salts. (In Russian.) M. T. Kozlovskii, P. P. Tsyb, and E. I. Ruzina. *Zhurnal Prikladnoi Khimii,* v. 24, Aug. 1951, p. 882-886.

The dependence of electrode potentials on the concentration of Zn in the amalgam and in the electrolyte for various conditions was determined. Data are tabulated and charted. (L17, Zn)

399-L. X-Ray Study of the Reactions of the Steel Surface When Titanium Enamel Is Applied Directly to Steel. Gordon S. Douglas and Jason M. Zander. *Better Enameling,* v. 23, Feb. 1952. p. 6-9, 22-23, 32-34.

See abstract from *Journal of the American Ceramic Society;* item 130-L, 1952. (L27, ST)

400-L. The Extension of the Life of a Nickel Bath by the Use of Barium Peroxide. Jason M. Zander and Otto C. Linhart. *Better Enameling,* v. 23, Mar. 1952, p. 6-7, 29-30.

Bath used to deposit a thin film of Ni on steel prior to vitreous enameling. (L27, Ni, ST)

401-L. Finishing Aluminum Castings. Evans Newcomb. *Canadian Metals,* v. 15, Apr. 1, 1952, p. 30-31.

Use of coated abrasive belts, sand and die-cast Al, inside polishing of aluminum ware, and mechanics of polishing Al. (L10, Al)

402-L. Filtering Is Key in Removal of Nickel Tank's Oxidized Sludge. *Ceramic Industry,* v. 58, Apr. 1952, p. 111.

How to go about saving Ni in the enamel plant with the oxidizing method of tank cleaning described in the previous issue. (L27, Ni)

403-L. Galvanic Behavior of Tin Dipped Coatings on Copper Alloys. F. L. LaQue. *Corosion* (News Section), v. 8, Apr. 1952, p. 1.

Shows that above coatings, as well as those of the Pb-Sn alloys, such as wiping solder (60% Pb, 40% Sn) may form corrosion-product films that may make them more noble without any effect due to the alloy layer near the interface between the coating and the base metal. Experimental graph. (L16, Sn, Pb, Cu)

404-L. Chlorinated Rubber Corrosion-Resistant Coatings. F. K. Shankweiler, G. N. Bruxelles, and R. E. Whitney. *Corrosion* (Technical Sec-

tion), v. 8, Apr. 1952, p. 130-139; disc., p. 139.

Numerous case histories of commercial use in varied maintenance problems where chemical resistance is essential establish the economical merit of these coatings. Among the fields discussed are acid plants, paper mills, water works, industrial machinery, sewage-disposal plants, and concrete construction protected by chlorinated rubber. Test panels and equipment are illustrated; data are tabulated. (L26)

405-L. Chromium Plating Reduces Roll Maintenance. Charles H. Belvin. *Fibre Containers and Paperboard Mills,* v. 37, Mar. 1952, p. 65-66, 68-70.

Preventive maintenance, recovery maintenance, and continuity maintenance. Considers various types of rolls, screen plates, etc. (L17, Cr)

406-L. Stresses in Vitreous Enamel on Cast Iron. *Foundry Trade Journal,* v. 92, Mar. 6, 1952, p. 259.

See abstract of "Stresses on Enameled Cast Iron," by Alfred Thürmer, *Berichte der Deutschen Keramischen Gesellschaft e.V. und des Vereins Deutscher Emailfachleute e.V.;* item 105-L, 1952. (L27, CI)

407-L. Direct-Fired Kilns and New Drying Method Increase Production 200 Per Cent. Frank S. Lappin. *Industrial Gas,* v. 30, Mar 1952, p. 10-12.

Expansion and production at Abingdon Potteries, a subsidiary of Briggs Mfg. Co., Detroit, producer of porcelain-enameled formed steel and vitreous china "beautyware." (L27, CN)

408-L. Chemical and Anodic Treatments; a Patent Review. *Light Metals,* v. 15, Mar. 1952, p. 93.

Anodizing patents published by the British Patent Office since 1946; their potential or known usefulness. (To be continued.) (L19, Al)

409-L. New Life for Worn Surfaces. *Linde Tips and Oxy-Acetylene Tips,* v. 31, Apr. 1952, p. 38-39.

Resurfacing by welding. (L24)

410-L. The Chromium Plating of Light-Metal Cylinders. *Metal Progress,* v. 61, Apr. 1952, p. 120, 122, 124, 126. (Condensed from "Light Metal Chromed Cylinders".)

Previously abstracted from *Engineer,* see item 574-L, 1951. (L17, Al)

411-L. Mechanical Descaling Method for Wire. *Metal Progress,* v. 61, Apr. 1952, p. 158, 160. (Translated and condensed from "The Method and Results Obtained With a Machine for Descaling Wire", Walter Zwierz.)

Previously abstracted from *Stahl und Eisen.* See item 68-L, 1952. (L10, ST)

412-L. The How and Why of Protective Coatings. Raymond P. Hill. *Paper Trade Journal,* v. 134, Apr. 4, 1952, p. 22, 24, 26.

Use of organic coatings in corrosion protection. (L26)

413-L. Comparative Wear Characteristics of Some Electrodeposited Metals. R. F. Ledford and E. A. Dominik. *Plating,* v. 39, Apr. 1952, p. 360-365.

Work done primarily to determine the wear resistance of electrodeposits commonly applied to printing plates. The standard test specimen was a section of a printing plate prepared in a standard, uniform manner. Comparative wear characteristics of electrodeposits produced from like solutions of different composition and operating conditions. Effect of some commonly considered contaminants or addition agents. Three Cu-plating solutions, one Fe solution, one Cr solution, and 8 Ni solutions were used. (L17, Q9, Cu, Ni, Cr, Fe)

414-L. Tentative Recommended Practice for Preparation of and Plating on Aluminum Alloys. (Concluded.) *Plating,* v. 39, Apr. 1952, p. 366-368, 375-376.

Cu plating, Cr plating, Au plating, Ni plating, Ag plating, Sn plating, and Zn plating on Al; racking; rinsing. Appendix on cleaning and conditioning treatments. (L17, Al)

415-L. Conservation of Nickel in the Plating of Chemical Process Equipment. A. Kenneth Graham. *Plating,* v. 39, Apr. 1952, p. 369-370, 376.

Factors that influence the minimum coating thickness required in plating of steel. Data are tabulated. (L17, Ni, ST)

416-L. Tests On Some Special Base Paints for the Protection of Magnesium Alloys. "Paints", His Majesty's Stationery Office (London), 1949, p. 35-48. (Based on R.A.E. Report by H. G. Cole.)

Sea-water spray corrosion tests were made on painted chromate treated Mg alloys. Method of testing and results tabulated. (L26, R11, Mg)

417-L. The Effect of Heating on the Corrosion Resistance of Chromate Treated and Painted Magnesium Alloy Castings. "Paints", His Majesty's Stationery Office (London), 1949, p. 53-62. (Based on R.A.E. Report by H. G. Cole.)

After chromate treating and painting with air-drying paints, castings were heated to 160° C. for 1 hr. Slight decrease in resistance to seawater spray corrosion occurred. Data are tabulated. (L14, L26, R4, Mg)

418-L. Tests on Phenyl Mercury Acetate As a Fungicide in Paints for the Protection of Magnesium Alloys. "Paints", His Majesty's Stationery Office (London), 1949, p. 63-70. (Based on R.A.E. Report by H. G. Cole.)

Tests of addition of one part in 2000 of phenyl mercury acetate as a fungicide in black finishing coat paints with respect to retardation of mold growth and corrosion of Mg alloys by sea-water spray. Data are tabulated. (L26, R4, Mg)

419-L. (Book) **Analysis of Electroplating and Related Solutions.** Kenneth E. Langford. 387 pages. 1951. Electroplating and Metal Finishing, 83-85 Udney Park Rd., Teddington, Middlesex, England.

More than 300 methods for the determination of principal constituents and impurities. Sampling, control of cleaners, pickles, dips, etches, phosphating solutions, and electrobrightners; analysis of plating salts and of water; physicochemical methods of analysis; preparation of standard solutions for volumetric analysis; and numerous tables. (L17, S11)

420-L. (Book) **Galvanizing (Hot-Dip).** Ed. 3. Heinz Bablik. 502 pages. 1951. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $10.00.

American edition; originally published in England. See item 144-L, 1951. (L16, ST, Zn)

421-L. (Book) **Paints.** 70 pages. 1949. His Majesty's Stationery Office, London W. C. 2, England. (Selected Government Research Reports, v. 2.)

Includes papers on effect of surface treatment of brass and yellow metals on the adhesion of paint films, tests on special base paints for protection of Mg alloys, and effect of heating on corrosion resistance of chromate treated and painted Mg alloy castings. Pertinent individual papers are separately abstracted. (L26, Mg)

422-L. Measurements on Thin Iron Films. A. Van Itterbeek, L. De Greve, and F. Heremans. *Applied Scientific Research,* sec. B, v. 2, No. 4, 1952, p. 320-324.

Curves are established for the specific resistance as a function of thickness for Fe films obtained respectively by sputtering or condensation in vacuum. The curves obtained with these two techniques are completely different. Electron microscope and electron diffraction pictures given. (L25, S14, Fe)

423-L. A Method for the Investigation of Electropolishing Problems. K. F. Lorking. *Australasian Engineer,* Feb. 7, 1952, p. 58-61. (From Symposium on "The Surface Treatment of Metals".)

Method based on technique developed by Hull and his co-workers for the investigation of optimum electroplating conditions. They designed a cell in which both electrodes are plates of metal placed vertically but not parallel to each other, so that the current density varies along the length of the cathode. In this manner the range of finishes produced over a wide range of current density may be investigated on the one electrode. (L13)

424-L. Bright Dipping. R. G. Stewart. *Australasian Engineer,* Feb. 7, 1952, p. 61-63. (From Symposium on "The Surface Treatment of Metals.")

The process has been applied primarily to Cu and Cu-base alloys and also used extensively for Cd and Zn plating. It produces a brightening of the surface and also provides some passivation of the treated surface. The composition of the dip is determined by the composition of the material and the result desired. (L16, Cu)

425-L. Chromium Plating With the Bornhauser Chrome Solution. Frank Taylor. *Electroplating and Metal Finishing,* v. 5, Apr. 1952, p. 109-113.

Operation and applications of the process together with details of the composition and maintenance of the solution. (L17, Cr)

426-L. Modified Bronze Plating as a Substitute for Nickel. G. Schmerling. *Electroplating and Metal Finishing,* v. 5, Apr. 1952, p. 115-118.

The requirements necessary for an alternative for Ni. Research with various alloys which have been tried as substitutes. The modified bronze or Nickelex process is considered a genuine substitute. (L17, Cu, Sn)

427-L. P. R. Copper Plating. *Electroplating and Metal Finishing,* v. 5, Apr. 1952, p. 119-120.

New Westinghouse patents are reviewed. (L17)

428-L. Modern Electroplating and Metal Finishing Processes. H. Cann. *Electroplating and Metal Finishing,* v. 5, Apr. 1952, p. 120.

Taken from a talk given to the London Section of the Institution of Production Engineers. Applications for electrodeposition. (L17)

429-L. Some Experience With a Proprietary Red Bronze Plating Solution as a Substitute for Nickel. F. S. Duc. *Electroplating and Metal Finishing,* v. 5, Apr. 1952, p. 123.

The process and information on corrosion resistance.
(L17, R general, Cu)

430-L. Drying and Finishing Ovens. Part III and IV. J. D. Russell. *Industrial Heating,* v. 19, Mar. 1952, p. 495-496, 498, 500, 502; Apr. 1952, p. 687-688, 690, 692, 699-700.

Part III: Horizontal wicket-type ovens for mass-production baking of flat sheet stock. Part IV: The tip-up oven and the vertical oven. Importance of effective air recirculation and a typical oven application—heat processing of a household refrigerator. (L26)

431-L. Production Finishing of Automotive Parts in Electric Radiant Panel Ovens. *Industrial Heating,* v. 19, Apr. 1952, p. 694, 696.

Procedures at the Detroit plant of Metal Mouldings Corp. (L general)

432-L. Vapor Deposition May Solve Today's Coating Problems. I. E. Campbell and C. F. Powell. *Iron Age,* v. 169, Apr. 10, 1952, p. 113-117.

Use for applying refractory coatings. Process can be continuous and is generally carried out at atmospheric pressure. Induction or resistance heating gives highest efficiencies, and temperature of surface being coated is most critical factor. Wire, rod, tubing, strip and shapes have been successfully coated. Tabular data gives types of coatings that can be vapor deposited. (L25, SG-h)

433-L. The Formation of Refractory Coatings by Vapor-Deposition Processes. Carroll Powell and I. E. Campbell. *Journal of Chemical Education,* v. 29, Apr. 1952, p. 181-186.

See abstract of "Vapor Deposition May Solve Today's Coating Problems", *Iron Age;* item 432-L, above. (L25, SG-h)

434-L. Unusual Chromium-Plating Problems. Alan W. Brown. *Machinery* (American), v. 58, Apr. 1952, p. 162-166.

Work on a variety of problems by Cro-Plate Co., Hartford, Conn. Includes preliminary abrasive-blasting operation. Steels and Al alloys are the principal base metals mentioned. (L17, ST, Cr, Al)

435-L. Barrel Finishing: an Economical Means of Processing Small Die Castings. H. K. Barton. *Machinery* (London), v. 80, Mar. 27, 1952, p. 555-560.

Covering mechanical actions involved, types of barrels, effects of barrel shape and overloading, and functions and kinds of carriers. Diagrams. (L10)

436-L. Wet Blasting Performs Many Cleaning and Finishing Operations. John L. Everhart. *Materials & Methods,* v. 35, Apr. 1952, p. 98-100.

Versatility of blasting with an abrasive suspended in a liquid. (L10)

437-L. Aluminum Photographic Process Has Industrial Applications. Eugene Wainer. *Materials & Methods,* v. 35, Apr. 1952, p. 176, 178, 180, 182, 184, 186.

See abstract of "Photos on Aluminum Resist Heat and Scratching", *Iron Age;* item 89-L, 1952. (L14, T9, Al)

438-L. The Formation of Metallic Coatings by Vapor-Phase Techniques. C. F. Powell and I. E. Campbell. *Metal Finishing,* v. 50, Apr. 1952, p. 64-69.

See abstract of "Vapor Deposition May Solve Today's Coating Problems", *Iron Age;* item 432-L, above. (L25, SG-h)

439-L. Silver Plating. J. B. Mohler. *Metal Finishing,* v. 50, Apr. 1952, p. 72-75.

Plating with the cyanide silver bath. Evaluates three formulas. Operating conditions and effects of increasing chemicals, temperature, and agitation. Tables. (L17, Ag)

440-L. Electroplating With Aluminum. Nelson F. Murphy. *Metal Finishing,* v. 50, Apr. 1952, p. 76-79.

Some of processes, shortcomings, and needs for future research. 32 ref. (L17, Al)

441-L. Modified-Bronze Plating. G. Schmerling. *Metal Industry,* v. 80, Apr. 4, 1952, p. 267-268.

See abstract of "Modified Bronze Plating as a Substitute for Nickel". *Electroplating and Metal Finishing,* item 426-L above. (L17, Cu, Sn)

442-L. Modern Theories of Adhesion and Its Measurement. L. Reed Brantley and Gordon Carpenter. *Official Digest,* Jan. 1952, p. 57-64.

Factors influencing adhesion of organic coatings to metals are broadly grouped into two classifications, physical and chemical. 26 ref. (L26, ST, Al)

443-L. Hot Applied Coal Tar Coatings. N. T. Shideler. *Pipe Line News,* v. 24, Apr. 1952, p. 34-37.

Raw materials used, the coatings and their manufacture, and the coating process in mill and field, for pipeline. Tabular data. (L26, CN)

444-L. Finishes Suitable For Powdered Metal Parts. *Precision Metal Molding,* v. 10, Apr. 1952, p. 83-87.

Because of their fundamentally porous nature some difficulty has been encountered in application of standard finishing techniques to parts produced from metal powders. However, there are a number of finishes which are pleasing and

corrosion resistant. Electroplated and black-oxide finishes and modifications of phosphate-coating processes. (L general, H general)

445-L. Preparation and Maintenance of Copper and Zinc Plating Baths Using Substitute Methods. Myron B. Diggin. *Products Finishing,* v. 16, Apr. 1952, p. 40, 42, 44, 46, 48, 50, 52, 54.

Various substitute bath compositions, often necessary because of shortages of certain chemicals. (L17, Cu, Zn)

446-L. Metallizing for Corrosion Prevention. Gilbert C. Close. *Products Finishing,* v. 16, Apr. 1952, p. 58-65.

The process and its applications. Recommended coatings for salt, industrial, and rural atmospheres and for immersion in fresh and sea water, are tabulated. (L23)

447-L. Spotlighting Finishing Progress. Allen G. Gray. *Products Finishing,* v. 16, Apr. 1952, p. 66, 68, 70, 76, 78, 82, 84, 86, 88, 90, 92, 94, 96.

Reviews recent work on phosphate coatings on metal; examining the adhesion of paint to steel; adherence of Co ground-coat enamels; and possibilities of Sb plating. (L general)

448-L. Automatic Setup for Spray Painting Shells. A. W. Gudge. *Products Finishing,* v. 16, Apr. 1952, p. 98-100.

Procedures and equipment at Binks Mfg. Co., Chicago. (L26)

449-L. The Theory and Practice of Vitreous Enamelling. (Concluded) J. H. Gray. *Sheet Metal Industries,* v. 29, Apr. 1952, p. 361-366.

Basic principles and requirements of the vitreous enameling process for castings. Frit formulas and production pointers. (L27, CI)

450-L. Electroplating and Mill Maintenance. Charles H. Belvin. *Southern Pulp and Paper Manufacturer,* v. 15, Apr. 10, 1952, p. 48, 50, 52, 54, 56.

Use of Cr and Ni for electroplating and reconditioning worn drums and rolls in the paper industry. (L17, Cr, Ni)

451-L. Oxide Films on Electrolytically Polished Copper Surfaces. J. A. Allen. *Transactions of the Faraday Society,* v. 48, Mar. 1952, p. 273-279.

Surfaces of polycrystalline Cu sheet polished electrolytically in H_3PO_4 were examined by an electrometric technique and by electron diffraction. The surfaces are initially free from oxide films when removed from the polishing bath. The subsequent growth of oxide films in air at room temperature depends on the washing procedure adopted. (L13, Cu)

452-L. The Metallizing Process. F. Keller. *Welding Journal,* v. 31, Apr. 1952, p. 291-295.

Brief historical review of the metallizing process; its field of application, apparatus needed, methods used in preparation of surfaces, the nature of the coatings and some applications. (L23, R)

453-L. Hard-Facing Spiral Surfaces. G. E. Kabacy. *Welding Journal,* v. 31, Apr. 1952, p. 340. (L24)

454-L. The R.A.E. Hot Half-Hour Chromate Bath for the Protection of Magnesium Alloys. L. F. LeBrocq and H. G. Cole. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 1-50.

The effect of temperature, concentration, salt ratio, and pH on the production of chromate films on pure Mg and alloys was examined in detail. Influence of variations in composition likely to occur during prolonged use of the hot half-hour chromate bath, and of impurities likely to gain access to the bath. A method for restoring a much-used bath to a freshly prepared condition. (L14, Mg, Cr)

455-L. Control of Sulphuric Acid Anodic Baths. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 51-55.

Specimens of sheet Al and duralumin were anodized in an experimental bath at 70-80° F. using a P.D. of 12 v. Observations were made of current consumption and change in weight of specimens. (L19, Al)

456-L. Control and Simplification of Bengough Anodic Process. J. W. W. Willstrop. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 56-66.

Tests were made with baths of various strengths of CrO_3 at constant temperature and at various stages of exhaustion. A method of determining the amount of film produced was developed, and quantity of film produced, current consumption and solution of metal compared for the treatment of Al and duralumin sheet in various solutions under different conditions of voltage control. (L19, Al)

457-L. Treatment in Cold Chromate Baths of Magnesium Alloy Parts Pre-

viously Treated in the Acid Chromate Dip and Lanolined. H. G. Cole and E. Parry. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 67-71.

Experiments were made on methods of chemical cleaning of Mg alloy parts prior to chromate treating in cold electrolytic and cold immersion baths. The parts were treated in the acid chromate dip and then lanolined. (L14, Mg)

458-L. Cleaning and Re-Chromate Treatment of Magnesium Alloy Castings, With Special Reference to Corroded Parts Machined to Close Limits. L. F. LeBrocq and L. Rakowski. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 72-86.

Methods of cleaning and rechromating finished Mg alloy castings which were chromate treated before machining, or which had become lightly corroded in store or in service. (L14, Mg)

459-L. Note on the Treatment of Magnesium Alloy to Specification D.T.D. 118 in Cold Chromate Baths (Baths i and ii of Specification D.T.D. 911) after Preliminary Treatment in the Acid Chromate Dip (Bath iv of Specification D.T.D. 911). M. K. Petch. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 87-89.

Results of test show that the R.A.E. electrolytic and cold chromate treatments, applied to material to Specification D.T.D. 118 treated in the acid chromate dip, are not as protective as when applied to bare metal. Pre-existing film should, therefore, be removed before the treatments are applied. (L14, Mg)

460-L. Chromate Treatments for Magnesium Alloys With Special Reference to Cold Baths. L. F. LeBrocq. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 90-119.

Experiments were made with the object of evolving cold chromate treatments of simple immersion or electrolytic types for Mg alloys. An immersion bath of composition Na_2Cr_2O (hydrated) 10%, potash alum 10%, $KMnO_4$ 5%, gave results equal to those obtained with the hot bath, when used in conjunction with paints. An electrolytic bath of composition $Na_2Cr_2O_7$ (hydrated) 15%, $KMnO_4$ 5%, caustic soda 0.2%, gave results superior to those obtained with the hot bath under the same conditions. (L14, Mg, Cr)

461-L. Electrolytic Polishing of Aluminium Alloys. B. W. Mott and E. C. W. Perryman. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 120-126.

Two electrolytes were investigated. Various alloys up to an alloying content of 20% were polished both electrolytically and mechanically for comparison of the surfaces obtained. Tests were made to find the effects of varying the current density, using a stirrer during polishing and changing the position of the electrodes. (L13, Al)

462-L. Methods of Removal of Corrosive Perspiration Deposits From Steel. S. G. Clarke and E. E. Longhurst. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 127-132.

The degree to which ordinary degreasing with trichlorethylene will remove sweat residues, and the efficiency of methanol in comparison with other methods. Investigation showed that fingermarks can cause marked corrosion of unprotected steel. Laboratory tests of some 20 possible removers showed the following as giving satisfactory results: methanol, certain neat soluble oils followed by washing, certain soluble oil emulsions used hot, water with a suitable inhibitor used hot or cold or in conjunction with a water displacer. (L12, R5, ST)

463-L. A Bright Dip for Steel. G. E. Gardam. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 133-134.

Process which produces a bright metallic luster on mild steel, medium carbon, plain and alloy steels. The surface, however, is not sufficiently smooth to give clear image reflection but a method of improving the appearance of tarnished, corroded, pickled or similar surfaces is provided. Composition of the dip and the technique. (L16, CN, ST, AY)

464-L. Protection of Steel by Different Lanolin Solutions. S. G. Clarke and E. E. Longhurst. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 135-139.

Tests were carried out on mild steel plates treated by dipping in lanolin solutions of a range of strengths in white spirit, solvent naphtha, and pure benzene. The results of tests and the effects of temperature of application are tabulated and represented graphically. (L26, ST)

465-L. The Water Vapour Permeability of Organic Coatings. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 140-148.

Methods for the meaurement of water vapor permeability. An investigation also embraced pigmented organic coatings with a view to ascertaining whether there is any relationship between water vapor permeability and the protective properties of paint films. A table gives the results obtained for a number of samples. Possible sources of error. (L26)

466-L. The Influence of Surface Contamination on the Corrosion of Magnesium Alloy Sheet to Specification D.T.D. 118. L. Rakowski. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 187-215.

Difficulties experienced in obtaining uniformity of chromate films, under various conditions, were investigated. The conclusions show the importance of insuring the highest possible cleanliness of the surface of the sheet material prior to chromating. (L14, Mg)

467-L. Protection of Magnesium Alloys Against Corrosion by Electrolytic Chromate Films. M. K. Petch. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 216-226.

Conditions were investigated under which chromate films can be formed on Mg alloy anodes and cathodes in solutions of CrO_3 and of $K_2Cr_2O_7$. The protective efficiencies of the more promising treatments were determined. (L14, Mg)

468-L. The Chemical Analysis of Cyanide Zinc Plating Solutions. A. Bacon. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 227-236.

A method for the chemical analysis of Zn cyanide plating solutions. Rapid routine methods applicable to a wide range of electrolytes. (L17, S11, Zn)

469-L. Test for Traces of Zinc in Nickel Plating Baths B. S. Evans. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 245-247.

Method for estimating small concentrations of Zn in Ni plating baths. It can also be used as a rapid test to determine whether a given Ni plating solution contains more than a limiting concentration of Zn. The reagents required for the test, and the results of trials on test solutions. (L17, S11, Zn, Ni)

470-L. Estimation of Nickel, Cobalt, Chloride, Formate and Formaldehyde in Nickel-Cobalt Plating Solutions. F. W. Salt. "Protection and Electro-Depositions of Metals", His Majesty's Stationery Office (London), 1951, p. 248-250.

(L17, S11, Li, Co, Cl)

471-L. Revised Methods of Analysis of Chromium Plating Solutions. F. W. Salt. "Protection and Electro-Deposition of Metals", Mis Majesty's Stationery Office (London), 1951, p. 251-254.

In the method described, all the constituents, including H_2SO_4, may be determined in about 1½ hr., whereas the earlier method took at least 4 hr. (L17, S11, Cr)

472-L. Selenium Coatings for the Protection of Magnesium Alloys Against Corrosion. L. F. LeBrocq and H. G. Cole. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 259-266.

Se deposited by a dry method gave as good protection to Mg alloy sheet to D.T.D. 120A and to propeller blade material as the hot half-hour chromate bath, and provided an equally good base for paint. (L14, Se)

473-L. Inspection Tests for the Adhesion of Electroplated Coatings With Particular Reference to the B.N.F. Adhesion Test. A. W. Hothersall and C. J. Leadbeater. "Protection and Electro-Deposition of Metals", His Majesty's Stationary Office (London), 1951, p. 282-294.

In addition to the B.N.F. adhesion test, which is carried out with the aid of a vibrating ball-ended hammer actuated by a fluctuating magnetic field, the shot impingement and the electrolytic test are described. (L17)

474-L. Preparation of Magnesium Surfaces for Painting. H. A. Barbian. *American Paint Journal,* v. 36, May 5, 1952, p. 31, 34.

Chemical treatments, especially those using products of Dow Chemical Co., Midland, Mich. (L26, L14, Mg)

475-L. The Properties of Metallic Coatings Produced by Evaporation and Sputtering. S. Tolansky. *Electrodepositors' Technical Society,* Advance Copy 3, 1952, 11 pages.

Methods, and characteristics of the deposits in so far as they have a bearing on problems associated with electrodeposition. (L25, L17)

476-L. Practical Considerations in the Application of Vacuum Coating for Metal Finishing. L. Holland. *Electrodepositors' Technical Society,* Advance Copy 4, 1952, 12 pages.

Design of tungsten filaments, rate of evaporation, effect of vapor incidence on Al film structure, design of workholders, glow-discharge bombardment, effects of contaminating vapors, reflectivity of evaporated Al films, and conclusions. (L25)

477-L. Lacquering to Obtain Brilliance and Metallic Lustre. H. H. Vevers and G. E. Gardam. *Electrodepositors' Technical Society,* Advance Copy 5, 1952, 8 pages.

Types of lacquer used for the base and top coats; methods of application and firing. The principle of the process is demonstrated by two simple experiments. In the usual type of application, a metallic coating is vacuum-deposited in a very thin film onto a surface which has been lacquered. A further lacquer coating is then applied to protect the metallic film. (L26, L25)

478-L. The Electrodeposition of Tin-Antimony Alloys From Chloride-Fluoride Electrolytes. J. W. Cuthbertson and N. Parkinson. *Electrodepositors' Technical Society,* Advance Copy 6, 1952, 7 pages.

Preliminary investigation shows that alloys of Sn and Sb containing up to about 45% Sb can be satisfactorily deposited from solutions containing the chlorides of the two metals, a fluoride, and an addition agent. Results so far obtained are encouraging, and the fact that bright plate can be deposited is noteworthy. (L17, Sn, Sb)

479-L. The Plating of Aluminium Articles as a Production Process. A. W. Wallbank. *Electrodepositors' Technical Society,* Advance Copy 7, 1952, 9 pages.

Various processes, with emphasis on one which has been in use for many years by practical platers and which has yet to be equalled in its own particular field by a process of laboratory origin. Cleaning, etching, and plating solutions for deposition of Ni, Zn, and brass on Al. (L17, Al, Ni, Zn, Cu)

480-L. Source of Defect-Producing Hydrogen in Porcelain-Enameled Steel. *Journal of the Franklin Institute,* v. 253, Apr. 1952, p. 343-345. (A condensation.)

A study using heavy hydrogen as a tracer indicates that H_2O present in the frit used in the coating is largely to blame for the defects. Experiments demonstrate feasibility of avoiding defects by using a H_2O-free frit. (L27, ST)

481-L. Aluminum Foil Stops Corrosion. *Iron Age,* v. 169, May 1, 1952, p. 147.

Method for sealing vehicles for storage and shipment to exclude water, developed and tested during the past 4 years at Letterkenny Ordnance Depot, Chambersburg, Pa. A bituminous mastic compound, Al foil, and an Al paint are used. The method has been adopted for use by the Ordnance Corps. (L general, Al)

482-L. High Temperature Coatings. Frederick D. Shaw. *Organic Finishing,* v. 13, Apr. 1952, p. 15-18.

Processes for application of ceramic or ceramic-metal types. Preparation of metal and ceramic slip. (L27)

483-L. Coating of Strip at the Thomas Strip Division, Pittsburgh Steel Company. *Plating,* v. 39, May 1952, p. 470-474.

Low-carbon, high-carbon, spring and alloy steel strip are processed. (L17, AY, CN)

484-L. Calibration of Plating Range Cells. J. B. Mohler. *Plating,* v. 39, May 1952, p. 475-476, 481.

Results of research on cells used as laboratory tools for electroplating control and experimentation. The slot cell and its calibration are emphasized. Current-density-distribution equations. (L17)

485-L. Chromium Plating Speed Tables. Eugene L. Combs. *Plating,* v. 39, May 1952, p. 482-485.

Relationship between temperature, current density, and current efficiency for the two standard Cr plating solutions. The current density is expressed both in amp. per sq. ft. and in amp. per sq. in. (L17, Cr)

486-L. Iron Plating Electrotypes and Stereotypes. Axel Lundbye. *Printing Equipment Engineer,* v. 82, Apr. 1952, p. 27-29.

(L17, Fe)

487-L. Ceramic Coating Saves Scarce Metals and Lengthens Life of High Temperature Parts. Hugh Penton. *Western Metals,* v. 10, Apr. 1952, p. 37-39.

Process by which ceramic coating is applied. The new Ryan A-418 coating. Many vital high-temperature jet-engine components, now made of Inconel, may be fabricated from Type 321 stainless steel and adapted to these same applications by the use of ceramic coatings. (L27, SS, SG-h)

488-L. Electroforming Solves Difficult Design and Fabrication Problems on New Military Items. M. H. Orbaugh. *Western Metals,* v. 10, Apr. 1952, p. 46-48.

The process and its advantages. Nickel, because of good corrosion resistance and wide limits within which its physical properties can be varied, is the most generally used metal for this process. However, practically all electroformed metals can be altered in physical properties by controlling the operating conditions and composition of the elctroforming baths. (L18, Ni)

489-L. How Navy in Seattle Refinishes Salt Water Pitted Propellers. Howard E. Jackson. *Western Metals,* v. 10, Apr. 1952, p. 49-50.

Series of steps involved include mechanical and chemical cleaning, anodizing, spray painting, etc. (L general, Al)

490-L. An Experimental Study of Electropolishing. (In French.) I. Epelboin. *Journal de Chimie Physique et de Physico-Chimie Biologique,* v. 49, Feb. 1952, p. C214-C218; disc., p. C218.

Discusses present theories on the degree of hydration of ions in solution. The similarity of the results obtained with baths with bases as different as ClO_4 or PO_4 indicates that the mechanism of electropolishing is the same in all cases. Results for a series of metals and simple binary alloys are tabulated and charted. 10 ref. (L13)

491-L. Light-Metal Cylinders With Hard-Chromium Contacting Surfaces. (In German.) E. Meyer-Rassler. *Aluminium,* v. 28, Jan.-Feb. 1952, p. 33-36.

Pretreatment which improves the properties of Cr-plated surfaces, used in internal-combustion engines. Micrographs show surface appearance and internal structures of the deposits. (L17, Cr, Al)

492-L. Anodized Aluminium. (In German.) A. Reuter. *Aluminium,* v. 28, Mar. 1952, p. 78-80.

Hints for avoidance of defects; influence of metallic impurities; choice of alloys for decorative effects; and surface preparation. (L19, Al)

493-L. Polishing of High-Purity Aluminum by Repeated Anodizing, and Removal of the Anodic Layer. (In German.) Richard Lattey. *Metalloberfläche,* v. 6, sec. A, Mar. 1952, p. A41-A48.

Apparatus and procedure. Influence of current density, as well as effect of repeated removal of the anodic layer upon reflection values. (L12, Al)

494-L. Grinding and Polishing of Aluminum and Aluminum Alloys, Especially Preparation for Anodic Oxidation (Eloxidation). (In German.) Richard Erdmann. *Metalloberfläche,* v. 4, sec. B, Mar. 1952, p. B36-B42.

Practical procedures for polishing and grinding, and the advantages of chemical or electrolytic polishing over mechanical polishing. (L12, L13, Al)

495-L. Electrolytic Brass Plating in Oxalic Acid Baths. (In Russian.) A. I. Stabrovskii. *Zhurnal Prikladnoi Khimii,* v. 24, May 1951, p. 471-476.

Oxalic acid was investigated as a replacement for cyanide solutions. Satisfactory results were obtained when a gelatin was added to the bath. Data are tabulated and charted. (L27, Cu)

496-L. Porosity of Electrodeposited Nickel. (In Russian.) A. A. Sutiagina and A. P. Vagramian. *Zhurnal Prikladnoi Khimii,* v. 24, Sept. 1951, p. 945-950.

The influence of thickness of deposit, current density, and various surface-active materials was investigated. Some materials were found to increase and others to decrease the number of pores. Up to a limiting value, porosity decreases with increasing thickness. The porosity-current density curve passes through a minimum. Data are charted. 11 ref. (L17)

497-L. The Problem of Electrodepsition of Cobalt. (In Russian.) P. N. Kovalenko. *Zhurnal Prikladnoi Khimii.* v. 24, Sept. 1951, p. 951-957.

The quantitative electrodeposition of Co was investigated. Temperature, pH, and ammonium oxalate concentration were found to be the controlling variables. Tables and graphs. (L17, Co)

498-L. Photographic Description of the Oxidation of Aluminum. (In Russian.) N. I. Kirillov and A. S. Kheinman. *Zhurnal Prikladnoi Khimii,* v. 24, Oct. 1951, p. 1019-1025.

See abstract of "Photographic Reproduction on Anodized Aluminum," *Metal Industry;* item 186-L, 1952. (L19, Al)

499-L. Criteria for Uniformity of Distribution of Metal on the Cathode and Methods for Its Determination. (In Russian.) L. I. Kadaner. *Zhurnal Prikladnoi Khimii,* v. 24, Oct. 1951, p. 1033-1044.

Use of experimental data to calculate satisfactory criteria. (L17)

500-L. Measurements on the Formation of Thin Tin Films. A. Van Itterbeek, L. De Greve, and F. Here-

mans. *Applied Scientific Research,* v. 2, Sec. B, 1952, p. 352-360.

The films are sputtered in He or Ne gas. Specific resistance and also the temperature coefficient were measured as a function of thickness. The oxidation phenomenon was studied by means of change in resistance as a function of time. Finally the structure of the films was analyzed by means of the electron microscope. (L25, M27, P15, Sn)

501-L. A Radioisotope Study of Cobalt in Porcelain Enamel. William N. Harrison, Joseph C. Richmond, Joseph W. Pitts, and Stanley G. Benner. *Journal of the American Ceramic Society,* v. 35, May 1, 1952, p. 113-120.

A typical porcelain enamel ground coat containing a small amount of radioactive Co as oxide was prepared, applied to sandblasted enameling iron blanks, and fired under conditions selected to give underfired, normally fired, and overfired coatings, respectively. Examination of these specimens revealed that a Co-bearing metallic deposit had been formed at the enamel-metal interface during firing, and that the enamel layer was depleted in cobalt oxide near the interface. (L27, Fe)

502-L. Ceramic Coatings. John V. Long. *Machine Design,* v. 24, May 1952, p. 122-126.

Research and results on development of coatings for heat resistant alloys for jet engines. Solaramic process which provides engine designers with a new and unique series of ceramic coatings, capable of enhancing metal life by reducing oxidation and intergranular corrosion and by stabilizing metal surfaces so they can operate for greatly extended periods at high temperatures. Service results of ceramic coated SAE 1010, 4130, and 321 stainless. (L27, CN, SS)

503-L. Aluminized Coatings. M. G. Whitfield and V. Sheshunoff. *Machine Design,* v. 24, May 1952, p. 139-140.

See abstract of "Aluminized Cast Iron", *Foundry;* item 636-L, 1951. (L16, Al, CI)

504-L. Clear Lacquers for Plated Parts. *Metal Finishing,* v. 50, May 1952, p. 57-59, 101.

Protection from corrosion or decay. Properties of paints and lacquers for Ag, brass, and Cu, with emphasis on Cr plate. (L26, Ag, Cu, Cr)

505-L. White Brass Plating. A Progress Report. W. B. Knight. *Metal Finishing,* v. 50, May 1952, p. 67-68.

See abstract from *Metal Progress;* item 381-L, 1952. (L17, Cu)

506-L. Polishers and Polishing. Charles Harris. *Metal Industry,* v. 80, Apr. 18, 1952, p. 308-310; Apr. 25, 1952, p. 326.

Shop problems and practices for metals in general. (L10)

507-L. Re-Finishing Worn Engine Cylinders. Gilbert C. Close. *Modern Machine Shop,* v. 24, May 1952, p. 118-120, 122, 124, 126, 128, 130, 132, 134, 136.

Reclamation of railroad diesel and aircraft radial-engine cylinders using "Porus-Krome", a modified hard-Cr plating process. (L17, Cr)

508-L. Protective Coating Requirements by the Bureau of Yards and Docks. *Paint and Varnish Production,* v. 42, May 1952, p. 22-23.

Applies to construction and maintenance of shore installations including Navy bases, aircraft stations, and Marine bases. Includes color schedule and preparation of surfaces and painting of steel pilings. (L general, ST)

509-L. Organic Finishing of Die Castings at Eastman Kodak. *Precision Metal Molding,* v. 10, May 1952, p. 46-47.

Pictures of a few of the finishing operations. Mentions Al and Mg. (L26, Al, Mg)

510-L. White Brass Plating. W. B. Knight. *Products Finishing,* v. 16, May 1952, p. 52, 54, 56, 58.

See abstract from *Metal Progress;* item 381-L, 1952. (L17, Cu)

511-L. Spotlighting Finishing Progress. Allen G. Gray. *Products Finishing,* v. 16, May 1952, p. 62, 64, 66, 70, 74, 78, 80, 84, 86, 88, 90, 92, 94, 96.

Extensive summaries and discussion of recent papers: how alkaline cleaners affect magnesium die castings; electrodeposition of aluminum; improving the fungicidal properties of organic coatings; and measurement of flexibility of lacquer films. (L general, Mg, Al)

512-L. Practical Applications of Modern Products. *Products Finishing,* v. 16, May 1952, p. 98-101.

Brief articles on corrosion protective films applied to military aircraft assemblies; new type ovens increase production of automobile accessories and trim parts; nine-stage unit processes drums; and rocking barrel blast unit cuts casting cleaning costs. (L general)

513-L. The Mechanical Surface Finishing of Metals. G. T. Colegate. *Sheet Metal Industries,* v. 29, Mar. 1952, p. 257-268.

Polishing, polishing operations, and the various types of wheels and equipment used. (To be continued.) (L10)

514-L. Some Factors Involved in the Enamelling of Hollow-Ware. K. H. Broadfield. *Sheet Metal Industries,* v. 29, May 1952, p. 459-461.

Removal of lubricants, pickling, assembly, choice and application of enamels, drying, and fusion. (L27, CN)

515-L. Rhodium Plating. F. Spicer. *Sheet Metal Industries,* v. 29, May 1952, p. 462-464.

Operating conditions and properties of coating together with photographs of typical rhodium plated products. (L17, Rh)

516-L. Coating Metal Used in Hot-Dip Galvanizing. Part I. Wallace G. Imhoff. *Wire and Wire Products,* v. 27, Apr. 1952, p. 356-360, 420-421.

A detailed discussion of the Zn plating bath. Qualities and characteristics of Zn. (To be continued.) (L16, Zn)

517-L. Electrolytic Tinplate — Its Production and Benefits. Samuel S. Johnston. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources.", 1951, p. 191-193; disc., p. 204-210.

Tinplate is produced from two principal types of electrolytes, acid and alkaline. Important differences. Principal means for fusion of electrodeposited Sn. 10 ref. (L17, SN, ST)

518-L. The Role of Protective Coats in the Conservation of Metals. U. R. Evans. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 223-227; disc., p. 240-244.

Advantages and disadvantages of various types. Application procedures. (L general)

519-L. Critical Potential of Deposition of Protactinium on Various Metals. (In French.) Jacques Danon and Christiane Ferradini. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Mar. 24, 1952, p. 1361-1363.

The possibility of determining the critical potential for deposition of Pa in Hf solution, using the β-ray emitter, Pa^{233}, and measuring the quantities of Pa deposited at the cathode at various potentials maintained constant during a given time. Graph. (L17, P15, Pa)

520-L. Apparatus for Vacuum Evaporation at High Pumping Speeds. (In French.) Rene Bernard and Francois Davoine. *Vide,* v. 7, Jan. 1952, p. 1136-1138.

A high-speed (230 per sec.) and low-pressure pumping installation, offering a ready means to obtain thin metallic films. Includes diagrams. (L25)

521-L. Kerosene-Oxygen Torches for Flame Cleaning Metal Surfaces. (In Russian.) L. I. Blagodatskii. *Avtogennoe Delo,* v. 22, Nov. 1951, p. 26-27.

Design and use. (L10)

522-L. (Book) **Electrolytic Polishing and Bright Plating of Metals. Ed. 2.** S. Wernick. 244 pages. Alvin Redman, Ltd., 4, Fitzroy St., Fitzroy Sq., London, W.1. 30s.

Electrolytic polishing of stainless steels, Ni, Al, carbon steels, Cu and Ag. Industrial applications of electrolytic polishing to nonferrous metals; various processes. Bright plating in Ni, Zn, Cd, Cu, and Ag, and the deposition of Pt, Pd, and Rh. An Appendix deals with development of bright Ni plating in America. Extensive bibliography. (L13, L17)

523-L. (Book) **Protection and Electro-Deposition of Metals.** 350 pages. 1951. His Majesty's Stationery Office, York House, Kingsway, London W.C.2, England. (Selected Government Research Reports, v. 3.)

A collection of reports, selected from research work carried out under the direction of the Ministries of Supply and Aircraft Production, now combined as the Ministry of Supply. Individual papers are separately abstracted. (L17, R general)

524-L. How to Electro-Polish Stainless Steel. Samuel Storchheim. *American Machinist,* v. 96, May 12, 1952, p. 140-141.

A resumé of the present theory and practical application of electropolishing written in terms of shop chemistry. (L13, SS)

525-L. Chromium Plated Piston Rings. *Automobile Engineer,* v. 42, May 1952, p. 181-182.

A resumé of experience gained by a British manufacturer in the development of Vacrom rings. Briefly discusses plating technique. (L17, T7, Cr, ST)

526-L. Pennsalt Gives: Key to Savings in Painting Costs. Robert R. Pierce. *Chemical Engineering,* v. 59, May 1952, p. 149-153.

On basis of comprehensive evaluation of general-purpose system in chemical-industrial atmospheres, a 3-coat system that will give enough build per coat for a five-mil minimum total thickness is recommended. 62 paint materials were studied. Data tabulated. (L26)

527-L. A Study of Acid Pickling Solutions for Wrought Iron and Steel With Special Reference to the Use of Inhibitors. E. E. Halls. *Electroplating and Metal Finishing,* v. 5, May 1952, p. 143-150.

(L12, Fe, ST)

528-L. The Use of Coated Abrasives in Wet Grinding and Polishing. *Electroplating and Metal Finishing,* v. 5, May 1952, p. 152-155.

Various applications of coated abrasives in grinding and polishing both metals and nonmetals. (L10, G18)

529-L. Sprayed Aluminum Coatings for the Protection of Steel. T. P. Hoar. *Electroplating and Metal Finishing,* v. 5, May 1952, p. 171, 173-174.

Comparison of wire and powder spraying of Al; electrochemical relationships of Al, Zn, and steel; composite Al-Zn coatings; sprayed coatings as basis for paint; and modification of sprayed Al coatings by heat treatment. (L23, Al, ST, Zn)

530-L. The Influence of the Wave Forms of Rectified Alternating Current on the Growth of Galvanic Deposits. M. E. Beckmann and F. Maass-Graefe. *Engineers' Digest,* v. 13, Apr. 1952, p. 115-116. (Translated and condensed.)

Previously abstracted from *Metalloberfläche.* See item 153-L, 1952. (L17, Sn, Cu)

531-L. Hot Spraying Proves Economical for Aircraft Finishing. Gilbert C. Close. *Finish,* v. 9, June 1952, p. 35-36, 79.

System used by El Segundo Div. of Douglas Aircraft Co. (L26)

532-L. The Use of Phosphors in Vitreous Enamels. Harold P. Cahoon. *Finish,* v. 9, June 1952, p. 39-41.

Research on preparation, application, and properties of luminescent enamels. Willemite gave superior results as a luminescent pigment. Base was 24-gage enameling iron. (L27, ST)

533-L. From Pickle Plant to Inspection. J. Eccleston. *Foundry Trade Journal,* v. 92, May 1, 1952, p. 473-475, 482.

Several new ideas and suggestions on sheet and cast iron enameling. Pickling, inspection, cover-coat enameling, titanium, opacification, mottling, and sieving. (L27, Fe, CI)

534-L. Gas-Fired Galvanizing Furnaces. Allen M. Thurston. *Industrial Gas,* v. 30, May 1952, p. 10-13, 26-28.

Design information and galvanizing operation details. Selecting the pot for the molten metal, types of burner applications, and heating up. Tables and diagrams. (L16, Zn, CN)

535-L. New Developments in Porcelain and Ceramic Coatings. Philip O'Keefe. *Materials & Methods,* v. 35, May 1952, p. 87-89.

One-coat enamels, improved enameling stock, and coatings having improved high-temperature, abrasion, and impact properties. (L27)

536-L. The Vacuum Coating of Metal Articles. L. Holland. *Metal Industry,* v. 80, May 2, 1952, p. 351-354.

Some problems of lacquering technique; properties required of lacquer coatings; influence of base article surface finish on quality of evaporated coatings; vacuum-coating properties of several commercial lacquers used as base coatings on metals; and tinting of evaporated Al films by dyeing the lacquer protective coating. (L25, Al)

537-L. Plastic Coatings Aid Refiners in Fight Against Corrosion. F. Lawrence Resen. *Oil and Gas Journal,* v. 51, May 19, 1952, p. 124, 127.

Use for both interior and exterior surfaces of exchangers, valves, and other equipment. (L26)

538-L. Prevention of Corrosion by Metallic Coatings. U. R. Evans, *Research,* v. 5, May 1952, p. 220-225.

See abstract of "The Role of Protective Coats in the Conservation of Metals", "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources," item 518-L. 1952. (L general)

539-L. Accelerated Phosphate Coating; Fits High Speed Finishing Setups. Norman Kuperschmid. *Steel,* v. 130, May 12, 1952, p. 92-93.

Rapid chemical process coats Zn and Cd parts in 30 sec. to 1 min. Ferrous surfaces are treated in 2-5 min. Application is simple. (L14, Cd. Zn, Fe)

540-L. Zinc Dust Recovery Collecting System Saves $6000 per Month. *Steel,* v. 130, May 19, 1952, p. 93-94.

System resulted in 50% increase in Zn dust recovery in pipe galvanizing operations at Etna, Pa., plant of Spang-Chalfant Div., National Supply Co., Equipment diagram. (L16, A8, Zn)

541-L. Production Rebuilding of Tractor Rolls by Submerged-Arc Welding. *Welding Journal,* v. 31, May 1952, p. 416.

With aid of a special work positioner and a Unionmelt welding machine, Alloy Hard-Facing Co., Minneapolis, is able to rebuild worn-out tractor rolls in a fraction of the time usually required. (L24, ST)

542-L. Aluminum Electrodeposited at Room Temperature. *Steel,* v. 130, June 9, 1952, p. 94-95.

Metal coats with good physical properties are produced by a new type organic plating bath developed at National Bureau of Standards. Methods for depositing Mo, W, Ti, and Zr were also studied. (L17, Al, Mo, W, Ti, Zr)

543-L. Radioisotope Study of Porcelain-Enamel Adherence. *Technical News Bulletin* (National Bureau of Standards), v. 36, May 1952, p.74-76.

See abstract of "A Radioisotope Study of Cobalt in Porcelain Enamel", William N. Harrison, Joseph C. Richmond, Joseph W. Pitts, and Stanley G. Benner, *Journal of the American Ceramic Society;* item 501-L. 1952. (L27, Fe)

544-L. Electroplating Process With a Leveling Effect. (In Dutch.) A. Dias Santilhano. *Metalen,* v. 7, Mar. 28, 1952, p. 99-106.

Significance and possibilities of leveling baths in contrast to bright baths. Various technical and chemical aspects, and savings effected by this process. Micrographs, tables, schematic diagrams. (L17)

545-L. Utilization of a Filament of Tungsten as a Support for the Silver Coating of Surfaces by Evaporation in a Vacuum. (In French.) Jean Roig and Emilienne Collet. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Apr. 21, 1952, p. 1677-1680.

Good adherence of globules of melted Ag to W was obtained after subjecting the latter to an electrolytic treatment. Compares results with those using a Ta support. (L25, Ag, W, Ta)

546-L. Cleaning of Stainless Steel. (In French.) J. Bary. *Métallurgie et la Construction méchanique,* v. 84, Mar. 1952, p. 259, 261.

HF and $Fe_2(SO_4)_3$ cleaning baths for stainless steel and their advantages. Includes chart. (L12, SS)

547-L. Influence of Cathode Material on the Electrodeposition of Metals. (In French.) R. Piontelli and C. Guerci. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Libreria Editrice Politecnica Cesare Taburini, Milan, Italy), 1951, p. 149-158; disc., p. 159.

Energetic and kinetic aspects of the influence of the nature, conditions of preparation, and surface state of the cathode material in the deposition of metals. Micrographs. 18 ref. (L17)

548-L. The Dynamic Behavior of a Cell for Electropolishing of Copper. (In French.) L. Meunier. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Libreria Editrice Politecnica Cesare Taburini, Milan, Italy), 1951, p. 242-252.

Use of aqueous solutions of orthophosphoric acid. Transitory phenomena at the beginning of the process; anodic oscillations; and short circuiting after polishing. Includes graphs. 12 ref. (L13, Cu)

549-L. Application of Cathodic Current to Metal Surfaces as an Indicator of the Oxide Coating, the Hydrogen Charge, and the Concentration of Dissolved Oxygen. (In German.) F. Tödt. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Libreria Editrice Politecnica Cesare Taburini, Milan, Italy), 1951, p. 232-239.

Experiments using a Pt cathode connected to a nonpolarized anode. Tables and graphs. 10 ref. (L21)

550-L. Ceramics for Jet Use Put Into Production. *Aviation Week,* v. 56, June 9, 1952, p. 30, 32, 35, 37.

Some operations at the Bettinger Corp., Waltham, Mass., devoted to production of high-temperature ceramic coatings of metal. (L27)

551-L. Materials for Tailor-Made Coatings. B. G. Brand. *Battelle Technical Review,* v. 1, May 1952, p. 48-51.

The ingredients of organic coatings—their properties, effects, and applications: pigments, extenders, vehicles, solvents, and additives. Development of improved inner coating for steel drums for Steel Shipping Container Institute at Battelle. (L26, CN)

552-L. Spraying Today in Porcelain Enamel Plants. M. L. Pouilly. *Better Enameling,* v. 23, May 1952, p. 6-8, 29.

General discussion of current shop practice with emphasis on advantages of low-pressure spraying. (L27)

553-L. New Enameling Facilities for the Industrial South. *Better Enameling,* v. 23, May 1952, p. 9-15.

The new 87,000-sq. ft. enameling plant of Athens Stove Works, Inc., Athens, Tenn. (L27)

554-L. Radioisotope Study of Porcelain Enamel Adherence. W. N. Harrison and J. C. Richmond. *Better Enameling,* v. 23, May 1952, p. 16-17.

See abstract of "A Radioisotope Study of Cobalt in Porcelain Enamel", William N. Harrison, Joseph C. Richmond, Joseph W. Pitts, and

Stanley G. Benner. *Journal of the American Ceramic Society;* item 501-L, 1952. (L27, Fe)

555-L. Automatic Submerged Arc Welding Speeds Critical Repairs. *Canadian Metals,* v. 15, May 1952, p. 48, 50.

Technique which applies a hard-alloy surface to crawler tractor rollers and idlers. (L24, ST)

556-L. Late Developments in Electrodeposition Techniques. William Blum. *Canadian Metals,* v. 15, May 1952, p. 52, 54.

Chromium plating, testing plated coatings, and plating from non-aqueous solutions. (L17)

557-L. Source of Defect-Producing Hydrogen in Porcelain-Enameled Steel. *Ceramic Age,* v. 59, May 1952, p. 44-45.

See abstract of paper of similar title by Dwight G. Moore, Mary A. Mason, and William N. Harrison, *Journal of the American Ceramic Society,* item 168-L, 1952. (L27, ST)

558-L. Uses Radioisotope to Examine Adherence of Porcelain Enamels. *Ceramic Industry,* v. 58, June 1952, p. 72-73.

See abstract of "A Radioisotope Study of Cobalt in Porcelain Enamel", William N. Harrison, Joseph C. Richmond, Joseph W. Pitts, and Stanley G. Benner, *Journal of the American Ceramic Society;* item 501-L, 1952. (L27, Fe)

559-L. How Chambers Enamels Ranges in 7 Colors. *Ceramic Industry,* v. 58, June 1952, p. 79, 81.

Procedure at Chambers Corp., Shelbyville, Ind. Zr enamels are applied in two coats. (L27, CN)

560-L. What to Do About Filter Press Plates. *Ceramic Industry,* v. 58, June 1952, p. 107.

Various possible coatings for protection of iron plates. Paint; enameling; and Zn, Cu, and Cd coating. (L general, Fe, Zn, Cu, Cd)

561-L. Small Parts Finishing System. Ralph Marson. *Industrial Finishing,* v. 28, May 1952, p. 24-27.

George R. Carter Co.'s plant, Detroit, Mich. Includes loading parts on conveyor, washing, phosphatizing, rinsing, dry-off, spray painting, and oven drying. (L26)

562-L. Hammer Finish for New Power Lawn Mowers. Samuel Standerfer. *Industrial Finishing,* v. 28, May 1952, p. 30-32.

Application of gray and green paint finish at Allied Sheet Metal & Roofing Co., Houston, Tex. (L26)

563-L. Painting the Hay Baler. Walter Rudolph. *Industrial Finishing,* v. 28, May 1952, p. 39-40, 42. (L26)

564-L. Fluorescent Lighting Fixtures. L. J. Rozier. *Industrial Finishing,* v. 28, May 1952, p. 56-58, 60.

Power washer, phosphating treatment, rinse, dry-off oven; spray painting a heated white enamel, and baking the enamel at 310° F. for 17 min. (L26)

565-L. Finishing of Harley-Davidson Motorcycles. *Industrial Heating,* v. 19, May 1952, p. 885-886, 888, 890.

Three paint finishing systems used at above company, with chief emphasis on the ovens involved. (L26, ST)

566-L. How Metal Spraying Speeds Production. *Industry & Welding,* v. 25, June 1952, p. 39-40, 67-69.

Spray metallizing of grinding-wheel spindles for increased life of wearing surfaces. (L23, ST)

567-L. Zinc Protects Trailer Parts From Corrosion. W. G. Patton. *Iron Age,* v. 169, May 29, 1952, p. 82-84.

A zinc protective coating, Zincilate 300, has been used extensively by Fruehauf Trailer Co., to protect steel parts from corrosion. This company has found the protective coating more expensive than prime paint but less costly than hard-to-get Cd. It gives good coverage and may be quickly applied by brush, spray, or dip. (L14, Zn)

568-L. Differential Thickness Coating on Electrolytic Tinplate. S. S. Johnston. *Iron and Steel Engineer,* v. 29, May 1952, p. 72-75; disc., p. 75.

Economic aspects of Weirton Steel Co.'s process for independently plating each side of sheet material. Marking system for identification of the respective sides. (L17, Sn, ST)

569-L. Throwing Power and Covering Power in Electroplating Solutions. W. de Bruijn. *Journal of the Electrodepositors' Technical Society,* v. 27, 1951, p. 1-9; disc., p. 9-11. (Preprint).

Fundamental principles and practical conclusions. (L17)

570-L. Recent Developments in Tin and Tin Alloy Plating. J. W. Cuthbertson. *Journal of the Electrodepositors' Technical Society,* v. 27, 1951, p. 13-20; disc., p. 21-22. (Preprint.) (L17, Sn)

571-L. Power Brushing Solves Many Production Problems. R. R. Schultz. *Machine and Tool Blue Book,* v. 48, June 1952, p. 186-188, 190, 192-193.

Equipment, procedures and applications. (L10)

572-L. Chromium Plating Baths Containing Fluorides or Fluosilicates. T. A. Hood. *Metal Finishing,* v. 50, June 1952, p. 103-106, 112.

Advantages over conventional H_2SO_4 bath, the most important being faster plating speed. Also advantages. 20 ref. (L17, Cr)

573-L. Some Notes on Hard-Coating Aluminum. Herbert E. Horn. *Metal Finishing,* v. 50, June 1952, p. 110-112.

Application of a hard oxide coating. Hardness of the coating; lack of warping during process; resistance to corrosion; heat resistance; operation of the process; alloys for coating; and applications. 20 ref. (L14, Al)

574-L. Radiometric Study of Phosphating Problems. Stanley L. Eisler and Paul G. Chamberlain. *Metal Finishing,* v. 50, June 1952, p. 113-116.

A number of problems pertaining to phosphating of steel were investigated. Results indicated that Fe from the solution becomes an integral part of the phosphate coating; residual phosphate is present on work after grit or sand-blasting; and rephosphating after grit or sand-blasting results in a lower process efficiency than after chemical removal of the original coating. Tables. (L14, ST)

575-L. Fabricated Plastics in the Plating Industry. Raymond B. Seymour and Earl A. Erich. *Metal Finishing,* v. 50, June 1952, p. 117-119.

Uses and techniques of application of fabricated plastic linings to various metal objects, such as tanks, pipe, hoods, ducts, and ventilating equipment. Welding of plastics. Tables give physical and chemical properties of ten common plastic materials. (L26)

576-L. Calculating Chromium Plating Speeds. *Metal Finishing,* v. 50, June 1952, p. 129.

Chart giving average plating speeds for bath containing 400 gm. per l. of chromic acid, and a chromic acid-sulfate ratio of 100:1 at various current densities and temperatures. (L17, Cr)

577-L. Pickling, Phosphating and Priming of Structural Steel. *Metallurgia,* v. 45, May 1952, p. 253-254.

Anti-corrosion treatment at Appleby-Frodingham Steel Co. The Footner process is used. (L12, L14, CN)

578-L. Methods for Testing for Enamel Coating Discontinuities. Stanley C. Orr. *Non-Destructive Testing,* v. 10, Apr. 1952, p. 23-27.

Previously abstracted from *Better Enameling,* item 82-L, 1952. (L27, S13)

579-L. Wax Type Protective Coatings for Industry. S. O. Greenlee and F. C. Kraatz. *Paint, Oil & Chemical Review,* v. 115, June 5, 1952, p. 16-18, 20, 44-45, 48.

Formulated wax systems, their properties and uses. Varied applications as metal coatings include metal sparkplug shells; miscellaneous corrosion-prevention uses; impact extrusion of Al collapsible tubes; and deep drawing operations. (L26, G4, G5, Al)

580-L. Finishing Methods for Precision Metal Moldings. *Precision Metal Molding,* v. 10, June 1952, p. 45-56, 68-74.

Miscellaneous finishing methods for die castings; investment castings; permanent-mold castings; plaster-mold castings; and powder-metal parts. (L general)

581-L. Influence of Electrical Field on the Formation of Thin Films. (In French.) Marcel Perrot and Jean-Pierre David. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Apr. 28, 1952, p. 1753-1755.

Effects of electrical field on vacuum deposition of thin films of Ag and Al were studied. Variations in resistivity of the films with applied field during the deposition process. Data are charted. (L25, Ag, Al)

582-L. The Thermal Formation of Thin Films of Gold and A. Fery's Transformation Points. (In French.) Antoine Colombani and Gaston Ranc. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Apr. 28, 1952, p. 1757-1759.

André Féry showed that, upon heating a thin film of Pt black obtained by cathodic sputtering in dry air during deposition of the Pt film, a discontinuous transformation with seven "breaks" at different temperatures takes place, shown by variation in electrical resistivity of the deposits. A similar investigation was made for Au, using vacuum deposition on a silica base. Films between 2000 and 10,000 Å. in thickness were studied. Apparatus and results. (L25, Au)

583-L. Continuous Pickling Plant for Strips and Plate. (In German.) P. Müller. *Metall,* v. 6, Apr. 1952, p. 182-187.

Equipment and procedures used by various German companies. (L12, ST)

584-L. Studies on Electrolytic Polishing. (In German.) Sakae Tajima. *Metalloberfläche,* sec. B, v. 4, Apr. 1952, p. B54-B58; May 1952, p. B73-B75.

See abstract in English, *Japan Science Review,* item 624-L, 1951. (L13)

585-L. Flame Spraying Nonmetallic Coatings Onto Metal Surfaces. (In German.) Hans Reininger. *Metalloberfläche,* sec. A, v. 6, May 1952, p. A71-A76.

Method and equipment. Importance of proper surface preparation and application for good adhesion and prevention of porosity. Photographs and tables. 25 ref. (L26)

586-L. Formation of Coating Films and of Protective Layers. (In German.) Ludwig Werner Haase. *Werkstoffe und Korrosion,* v. 3, May-June 1952, p. 198-205.

The concepts of coating films and protective layers are defined. Various types and their chemical and electrochemical effects. Practical examples show factors influencing the formation of films. (L14, R10)

587-L. Some Aspects of Anodising. K. H. Belcher. *Austaralasian Engineer,* Mar. 7, 1952, p. 66-71.

Mechanism; composition and structure; classification; factors affecting production; comparison of main processes; and effect of alloy constituents. Diagrams and tables. 27 ref. (L19, Al)

588-L. The Surface Treatment of Magnesium. D. R. Hendry. *Australasian Engineer,* Mar. 7, 1952, p. 72-75.

Chemical protective pretreatment; electroplating; painting. Includes table listing chemical treatments by class, their compositions, application methods, etc. (L14, L17, L26, Mg)

589-L. Gasoline Resistant Tank Coatings. W. W. Cranmer. *Corrosion* (Technical Section), v. 8, June 1952, p. 195-204.

The paint problem; also coating underground, concrete, gasoline-storage tanks. Surface preparation, ventilation, safety precautions and costs. Methods other than coatings were investigated. (L26, R8, ST)

590-L. Interconnection of Pipe Lines Having Various Coatings. David Hendrickson. *Corrosion* (Technical Section), v. 8, June 1952, p. 212-216.

Design of concrete-coated steel aqueducts interconnected with aqueducts with bituminous coating. Galvanic current generated by interconnecting the two aqueducts with different coatings is shown in a specific case. Proper method for isolating these aqueducts is discussed; also results of trying to isolate the two pipe lines by installing insulating joints within a network of interconnecting pipes. Recommended precautions in technique. (L, R, ST)

591-L. Complex Parts Easily Coated With Aluminum. W. G. Patton. *Iron Age,* v. 169, June 12, 1952, p. 115-118.

New method developed by General Motors for imparting corrosion and heat resistance to fabricated steel parts by dipping them in an Al bath. (L16, Al, ST)

592-L. A Hydride Bath for the Electrodeposition of Aluminum. Dwight E. Couch and Abner Brenner. *Journal of the Electrochemical Society,* v. 99, June 1952, p. 234-244.

Process developed for deposition of Al from an ethereal solution of $AlCl_3$ and a metal hydride. An investigation was made of the effect of various inorganic addition-agents on the type of deposit produced from the fused $AlBr_3$-KBr bath. 32 ref. (L17, Al)

593-L. The Mechanism of the Tungsten Alloy Plating Process. Walter E. Clark and M. H. Lietzke. *Journal of the Electrochemical Society,* v. 99, June 1952, p. 245-249.

The mechanism postulated for the plating of tungsten alloys includes: deposition of a film of partly reduced tungstate on the cathode and catalytic reduction of this film by H_2 in the presence of freshly deposited Fe, Co, or Ni. 27 ref. (L17, W)

594-L. The Electrolytic Polishing of Lead-Tin Alloys for Microscopic Examination. A. W. Moulen. *Journal of the Electrochemical Society,* v. 99, June 1952, p. 133C-36C.

Technique for the electrolytic polishing of Pb, Sn and their alloys, which produces polished and etched specimens without laborious initial grinding and surface preparation, at the same time avoiding the handling of potentially explosive chemicals. Photomicrographs. (L13, Pb, Sn)

595-L. Chemical and Anodic Treatments. (Continued.) V. F. Henley. *Light Metals,* v. 15, May 1952, p. 141-148.

A British patent review covering those published since 1946. Appraises their potential or known usefulness. (To be continued.) (L14, L19, Al)

596-L. Organic Coatings for Metallizing. Robert B. Stanton. *Organic Finishing,* v. 13, May 1952, p. 18-19.

Consists of using clear lacquer or a similar resinous medium, in which metal powders are dispersed as pigments, to coat a metallic or nonmetallic surface. (L26)

597-L. New Pipe Coating Process. Frank H. Love. *Petroleum Engineer,* v. 24, June 1952, p. D7-D8.

The impact application of H. C. Price Co.'s Hevicote, a heavy concrete-type coating, to line pipe to give it negative buoyancy and protection from corrosion. (L27, CN)

598-L. Application of Hot Applied Coal Tar Coatings for Pipe Lines. N. T. Shideler. *Pipe Line News,* June 1952, p. 38-41.
(L26, ST)

599-L. Some Characteristics of Zinc Cyanide Plating Solutions. III. Limiting Anode Current Density and Solution Resistivity. Gustaf Soderberg. *Plating,* v. 39, Apr. 1952, p. 377-379.
Three-dimensional graphs show limiting anode current densities in Zn solutions, and resistivity of Zn solutions at 77° F. (To be concluded.) (L17, Zn)

600-L. Clear Protective Coatings for Copper-Chromium Plate. Wayne R. Fuller. *Plating,* v. 39, June 1952, p. 616-618, 622.
Screening tests for various types of resins. Processing factors, stripping, coating repair, and coatings on Zn. (L26, Cr, Zn)

601-L. The Preparation of Tinplate for Painting. S. C. Britton. *Sheet Metal Industries,* v. 29, June 1952, p. 545-548, 558.
Experimental evaluation of various methods. Results of scratch tests on painted surfaces following different pretreatments are tabulated and illustrated. (L26, Sn, ST)

602-L. Process Control in Vitreous Enamelling. H. W. Clewes. *Sheet Metal Industries,* v. 29, June 1952, p. 549-556.
Recommended test procedures applied to various steps and materials. (L27)

603-L. Metal Spraying Technique as Applied to Protection. W. E. Ballard. *Transactions of the Institute of Welding,* v. 15, Feb. 1952, p. 19-22.
Technique using the wire process. Steel, Al, and Zn are mentioned. Micrograph, photographs, and cross-section deposit diagrams.
(L23, ST, Al, Zn)

604-L. The Use of Metal Spraying for the Protection of Structural Steelwork. V. E. Stanbridge. *Transactions of the Institute of Welding,* v. 15, Feb. 1952, p. 23-25, 30.
Factors affecting choice of metal spraying vs. other anticorrosive treatments. Preparatory cleaning methods, and joining methods in relation to metal spraying. The metal sprayed was Al. Tables and photographs. (L23, CN, Al)

605-L. Metal Spraying as a Building-Up Process. A Brief Survey of Techniques, Characteristics and Applications. J. Barrington Stiles. *Transactions of the Institute of Welding,* v. 15, Feb. 1952, p. 26-30.
The manner and adequacy of the bond; cohesion of particles forming the coating; and when to use the method. Photographs, micrographs, and diagrams. (L23)

606-L. Salvage of Worn Machinery by Metal Spray. G. A. Onion. *Transactions of the Institute of Welding,* v. 15, Feb. 1952, p. 31-32.
Surface preparation; nature of wear and metal to be used; corrosive conditions; and economics.
(L23)

607-L. Coating Metal Used in Hot-Dip Galvanizing. Part II. Wallace G. Imhoff. *Wire and Wire Products,* v. 27, May 1952, p. 469-472.
Impurities generally found in Zn slab—Fe, Pb, and Cd, their beneficial and detrimental effects, and possible methods of elimination. (To be continued.) (L16, Zn, ST)

608-L. Hints for Bronze-Surfacing. W. O. Whitehead. *Welding Journal,* v. 31, May 1952, p. 419.
Recommended procedures for repair of worn parts. (L24)

609-L. A New Coating Process for Carbon Wire. Harold Trembicki. *Wire and Wire Products,* v. 27, May 1952, p. 473-475.
The Tioxicoat process forms a titanium oxide with exceptional spreading or flowing properties. All scale is removed in the patenting furnace, thereby eliminating the pickling and cleaning operation entirely. (L16, F28, ST)

610-L. (Book) **Chemical and Electroplated Finishes—the Protective Treatment of Metals. Ed. 2.** H. Silman. 479 pages. 1952. Chapman and Hall, Ltd., 37 Essex St., London. 50s. net.
Modern industrial finishing processes, together with chemical and physical principles involved. This edition contains some revision together with substantial additions. The opening chapter gives a brief account of principles of corrosion. Remainder of the book deals with industrial processes, giving a brief scientific explanation, the processes proper, plant requirements, process control, and testing. New material on blasting, descaling, polishing methods and compositions, emulsion cleaning, chemical finishes and coloring, plating machines, electrodeposition, testing methods, etc.
(L general, R1)

611-L. Recommendations Affecting Standards Relating to Electrodeposited Metallic Coatings. *American So-*

ciety for Testing Materials, Proceedings, v. 51, 1951, p. 202-203.
Previously abstracted from Preprint 13; item 439-L, 1951.
(L17, Zn, Al, SS)

612-L. Aspects of "Brightening" in Silver Baths. H. E. Arblaster. *Australasian Engineer*, Apr. 7, 1952, p. 73-75.
Nature of the 'bright' silver deposit; probable chemical compounds formed in cyanide plating baths; and electrolysis of NaCN plating solutions. 12 ref. (L17, Ag)

613-L. Porcelain Metals Celebrates Its 25th Anniversary. *Better Enameling*, v. 23, June 1952, p. 8-14.
Historical development of the Porcelain Metals Corp., Louisville, Ky. The metal shop, and enamel-processing department. (L27, A5, ST)

614-L. The Anodic Oxidation of Aluminium. G. C. Thompson. *Electronic Engineering*, v. 24. June 1952, p. 281-283.
Relative merits of different processes for the above. Theory.
(L19, Al)

615-L. Metal Spraying in Industry. G. A. Onion. *Electroplating and Metal Finishing*, v. 5, Feb. 1952, p. 69-70; Apr. 1952, p. 137-138.
Previously abstracted from *Transactions of the Institute of Welding;* see item 606-L, 1952. (L23)

616-L. Plating Powder Metal Compacts. *Electroplating and Metal Finishing*, v. 5, June 1952, p. 201.
Plating before sintering and the avoidance of cyanide electrolytes are recommended. An example of Ni plating of iron. (L17, Ni, Fe)

617-L. Metal Spraying as a Marking Process. *Electroplating and Metal Finishing*, v. 5, June 1952, p. 207, 209. (Condensed from *Product Finishing*, Dec. 1951.)
A number of applications of metal spraying, chiefly for electrical manufacturing purposes. Variety of metals used in spraying. (L23)

618-L. Transfer of Wood Grain to Sheet Metal. Howard T. Davis. *Industrial Finishing*, v. 28, June 1952, p. 26-31, 33.
Process at Parker-Wolverine Div., Udylite Corp. Metal preparation and the transfer process involving coating, color printing, and baking operations. (L26)

619-L. Baked Clear Coat Protects Chrome-Plated Auto Parts. P. C. Bardin. *Industrial Finishing*, v. 28, June 1952, p. 44-46, 48, 50.
Set-up includes a 4-stage cleaning operation, drying oven, electrostatic spraying to put on a clear synthetic coat, and oven baking, with an effective automatic control system. (L26, Cr)

620-L. Production Finishing of Electrical Equipment. Bruce Robert. *Industrial Finishing*, v. 28, June 1952, p. 70-72, 74.
At Emerson Electric Mfg. Co. Chief example is the application of black wrinkle enamel on electric fans. (L26)

621-L. Glazing Bread Pans With Gas. William Helme. *Industrial Gas*, v. 30, June 1952, p. 3-5, 23.
The Glazon process, in which a specially formulated resin coating is applied to bread pans to prevent contents from sticking. (L26)

622-L. Plates and Sections: Phosphating Treatment at Appleby-Frodingham. *Iron & Steel*, v. 25, June 1952, p. 282.
The Footner process, providing steel which has been pickled, phosphated, and primed. (L14, ST)

623-L. Shot Blasting Speeds Stainless Strip Cleaning. J. B. Delaney. *Iron Age*, v. 169, June 19, 1952, p. 133-135.
Costs were drastically cut at the West Leechburg plant of Allegheny Ludlum Steel Corp. with installation of a Wheelabrator shot-blasting unit in the strip-pickling line. Chief cost saving is elimination of scale-breaking on straight chrome grades. (L10, SS)

624-L. A Non-Electrolytic Smoothing Treatment for Steel. W. A. Marshall. *Journal of the Electrodepositors' Technical Society*, v. 28, 1952, p. 27-46. (Preprint.)
It was found that aqueous solutions containing $H_2C_2O_4$, H_2O_2, and H_2SO_4 exert a pronounced smoothing action on ferrous alloys, producing, with mild steel and white-heart malleable cast iron, a considerable degree of polish. Very strong adhesion of electrodeposited Ni to treated steel has been obtained, typical values being of the order of 50 tons per sq. in.
(L12, CN, CI, Ni)

625-L. The Physical and Chemical Changes Which Accompany the Polishing of Metals. A. J. W. Moore. *Journal of the Electrodepositors' Technical Society*, v. 28, 1952, 8 pages. (Advance Copy No. 1)
Area of contact; temperature of sliding; surface damage; theory of friction; properties of polished metal; mechanism of polishing; role of the abrasive; and structure of deformed layers. Micrographs. (L10)

626-L. An Electron-Diffraction Investigation of the Structure of Electrodeposited Coatings on Iron Single

Crystals. D. J. Evans and M. R. Hopkins. *Journal of the Electrodepositors' Technical Society,* v. 28, 1952, 10 pages. (Advance Copy No. 8)

Experimental procedure and results obtained in deposition of Zn, Cu, and Ni on Fe single crystals. (L17, M27, Fe, Zn, Cu, Ni)

627-L. Zinc Dust as a Protective Pigment. A. Pass. *Journal of the Oil & Colour Chemists' Association,* v. 35, June 1952, p. 241-261.

Methods of preparation and physical, chemical and pigmentary properties of zinc dust. Reviews various paint formulations in which the pigment is used, including cementiferous paints based on inorganic binders. Theoretical considerations underlying the anticorrosive properties of Zn dust paints; different considerations applying to marine and atmospheric exposures. 16 ref. (L26, Zn, ST)

628-L. The Use of Aluminium Contacts in Electro-Polishing. H. J. Hartley. *Journal of Scientific Instruments,* v. 29, June 1952, p. 204.

Method using an insulating film of colloidal Al hydroxide on pure Al wire for establishing electrical contact without current leakage through the solution. (L13, Al)

629-L. Stainless-Clad Copper Promises Improved High-Temperature Service. *Machine Design,* v. 24, June 1952, p. 141-142.

"Sandwiching" of Cu and steel for highest thermal conductivity of a heat resisting material. Two outstanding benefits are the saving in weight and critical materials. An important application is in jet-aircraft engines. (L24, T24, SS, Cu, SG-h)

630-L. Electroplated Coatings on the Light Metals. Philip O'Keefe. *Materials & Methods,* v. 35, June 1952, p. 119-130.

The metals discussed are Al, Mg, and Ti. Surface preparation for plating; plating processes; properties of the electrodeposits; and applications of plated Al and Mg. (L17, Al, Mg, Ti)

631-L. Production Plating of Aluminium. A. W. Wallbank. *Metal Industry,* v. 80, May 30, 1952, p. 442-443; disc., p. 443-444. (A condensation.)

Recommended procedures. Composition and operating conditions of cleaning and plating solutions are tabulated. Metals plated are Zn, brass, and Ni. (L17, Al, Zn, Cu, Ni)

632-L. Finishing Metal Parts for Telephones. F. B. Rinck. *Metal Progress,* v. 67, June 1952, p. 65-70.

Plating and inorganic finishing of a wide variety of parts using 16 types of inorganic finishes and many kinds of organic systems. Automatic equipment is used for Zn, Ni, Cu-Ni, Au, Ag, and Cu-Sn. Barrel-plating sections, cleaning, degreasing, passivation, etc. Main base metals are brass, steel, and Al. (L general, Cu, ST, Al)

633-L. Hard Chromium Plate and Bright Plating of Steel or Die Castings. Allen G. Gray. *Metal Progress,* v. 67, June 1952, p. 77-78, 170, 172.

Reviews recent work, including the self-regulating Cr-plating bath, properties of Cr plate, decorative uses, and Cr-plated die castings. (L17, Cr)

634-L. An Improved Cell for Electrolytic Polishing. L. W. Gleekman, G. E. Evans, and C. S. Grove, Jr. *Metal Progress,* v. 67, June 1952, p. 92-93.

Made from lucite tubing, closed with polystyrene plugs. Useful for acid electrolytes other than perchloric. In polishing of 14-carat gold, tests were run to determine effect on microstructure of such variables as electrolyte composition, cell voltage and current, previous mechanical polish, cathode-anode distance, rate of agitation, time of current flow, and cathode material. (L13, Au)

635-L. Improved Finish for Magnesium Alloys. *Metal Progress,* v. 67, June 1952, p. 166. (Condensed from "A New Finish for Magnesium Alloys", Harry A. Evangelides.)

Previously abstracted from *Metal Finishing.* See item 720-L, 1951. (L13, R general, Mg)

636-L. Plating Aluminum With Nickel. *Metal Progress,* v. 67, June 1952, p. 168. (Condensed from article by A. G. Thomson, *Metallurgia,* v. 44, Dec. 1951, p. 308.)

Directions for modified etching and plating solutions and procedures developed in the laboratory. Applications. (L17, Al, Ni)

637-L. Outlook for Tin Conservation. R. R. Hartwell. *Modern Packaging,* v. 25, June 1952, p. 136-139, 182, 185.

Directions of approach and technical limitations of further reductions in coatings. Experimental procedures. Tabular and graphical data on performance of different types and thicknesses of tin coatings on cans used to store various types of food. (L16, T29, Sn, ST)

638-L. Migration of Cobalt During Firing of Ground-Coat Enamels on Iron. William N. Harrison, Joseph C. Richmond, Joseph W. Pitts, and Stanley G. Benner. *National Advisory Com-*

mittee for Aeronautics, Technical Note 2695, June 1952, 28 pages.

See similar abstract from *Journal of American Ceramic Society;* item 501-L, 1952. (L27, Fe)

639-L. The Utilization of Norelac Resins in Protective Coatings. A. J. Lewis, L. B. Falkenburg, and J. C. Cowan. *Paint, Oil & Chemical Review,* v. 115, June 19, 1952, p. 13-14, 17.

Results of studies on durability tests made to determine the suitability of Norelac as a wood sealer, corrosion-resistant coating, and as a finish coating on wood and steel. Extensive tables. (L26, ST)

640-L. Vinyl Coatings Protect Marine Installations From the Ravages of Corrosion. H. E. Waldrip. *Oil and Gas Journal,* v. 51, June 16, 1952, p. 291-292, 295-296, 298-300, 303-304, 306, 309-310.

Variables in formulation of vinyl coatings; need for evaluation; proper surface preparation; and constant supervision and inspection during application on marine equipment used in the search for and production of oil. 11 ref. (L26, ST)

641-L. Bicycle Finishing in Japan. Ezra A. Blount. *Products Finishing,* v. 16, June 1952, p. 88-98.

The plant whose finishing operations are described employs a Ransburg electrostatic paint-spray unit, and uses a surface-conversion dip to produce bright zinc plate. (L16, L26, Zn, ST)

642-L. Giant Construction Equipment Gnome Size. Frank L. Bonem. *Products Finishing,* v. 16, June 1952, p. 104-110.

Equipment and procedures for production of toys at Doepke Mfg. Co., Rossmoyne, Ohio. Principal raw materials are sheet steel and aluminum. Emphasis is on finishing procedures — degreasing and spray painting. (L general, Al, ST)

643-L. Spotlighing Finishing Progress. Allen G. Gray. *Products Finishing,* v. 16, June 1952, p. 114, 116, 118, 120, 122, 124.

Reviews recent work on current distribution in Cr plating and on methods for measurement of thickness of organic coatings. (L17, S14, Cr)

644-L. Corrosion. 5. The Protective Action of Paints. J. E. O. Mayne. *Research,* v. 5, June 1952, p. 278-283.

How paint films inhibit corrosion by virtue of their high electrolytic resistance; the electrochemical theory of corrosion applied to the protective action of paints for iron and steel. 24 ref. (L26, R1, Fe, ST)

645-L. Regular Structure Produced on Aluminium by Electro-Polishing. G. L. Bucknell, G. A. Geach, and N. C. Welsh. *Research,* v. 5, June 1952, p. 289-290.

The furrow-like structures produced on Al. (L13, Al)

646-L. New Aluminum-Plating Process. *Technical News Bulletin* (National Bureau of Standards), v. 36, June 1952, p. 86-87.

See abstract of "A Hydride Bath for the Electrodeposition of Aluminum", Dwight E. Couch and Abner Brenner, *Journal of the Electrochemical Society;* item 592-L, 1952. (L17, Al)

647-L. Electrotinning Copper Wire: A New Process. Part I. The Process. Part II. The Machine. Frederick A. Lowenheim. *Wire and Wire Products,* v. 27, May 1952, p. 464-467, 506-507; June 1952, p. 565-568, 632-633.

Part I: Advantages over hot dipping; types of baths; calculation methods. Details of the potassium stannate bath procedure. Sludge formation, type of deposit, rinsing, drag-out recovery, and ventilation. Part II: Physical elements of a process for the continuous deposition of tin upon a moving copper strand. (L17, Cu, Sn)

648-L. (Czech.) Electrolytic Zinc Plating of Sheet Iron and Its Protection. Josef Teindl. *Hutnické Listy,* v. 7, Mar. 1952, p. 132-139.

The replacement of hot galvanizing by electrolytic Zn plating for sheet and strip. Proposes a method of preventing the formation of black spots on the inside of plated cans. Equipment diagrams. 14 ref. (L17, Zn, CN)

649-L. (French.) Study of Variation of the Oxidation Rate of an Al-Mg Alloy With Orientation of the Crystal Structure. J. Herenguel and P. Lelong. *Revue de Métallurgie,* v. 49, May 1952, p. 374-378.

See similar abstract from *Comptes Rendus hebdomadaires des Séances de l'académie des Sciences;* item 579-L, 1951. (L19, M26, Al)

650-L. (French.) New Electropolishing Cell. Applicability to the Polishing of Cast Iron. André Roos. *Revue de Métallurgie,* v. 49, May 1952, p. 385-389; disc., p. 390.

An electrolyte permitting very fast electropolishing of pearlite cast iron containing 2.61% C, 1.89% Si, 0.044% S, 0.14% P, 0.59% Mn, 0.05% Cr, and 0.21% Mo. The arrangement for electrolysis is diagrammed. Influence of the electrolyte, role of surface tension, and mechanism of polishing. (L13, CI)

651-L. (German.) **Production of Materials Resistant to High Temperatures by Siliconizing of Tungsten and Molybdenum.** Erick Fitzer. *Berg- und Hüttenmännisch Monatshefte der Montanistischen Hochschule in Leoben,* v. 97, May 1952, p. 81-90.

The siliconizing of W and Mo wire and their properties. Production of Mo-Si alloys by means of powder metallurgy. Practical applications. Tables, micrographs, diagrams, and graphs. 21 ref.
(L15, H general, Mo, Si, W, SG-h)

652-L. (German.) **The Patent Literature in the Field of Anodic Oxidation of Aluminum.** Max Schenk. *Metalloberfläche,* v. 4, sec. B, Mar. 1952, p. B43-B46; Apr. 1952, p. B59-B61; June 1952, p. B91-B92.

Includes tabular summary covering German, U. S., British, French, and other patents. (L19)

653-L. (German.) **The Influence of Audible Sound and Ultrasonics on Electrochemical Processes. Part III.** Albert Roll. *Metalloberflache,* ser. B, v. 4, June 1952, p. B81-B89.

Electrolytic precipitation of metals by the effect of ultrasonics. Various experimental arrangements for this purpose. Precipitation of Ni, Cu, and Cr from solution. Superior mechanical properties (tensile strength and hardness) are shown to exist. Graphs and micrographs.
(L17, C23, Ni, Cu, Cr)

654-L. (German.) **Grinding and Polishing in Chromium Plating.** R. Erdmann. *Metalloberfläche,* ser. B, v. 4, June 1952, p. B89-B91.

Special processes necessary because of the hardness of the chromium layer. Various defects of the layer, and methods for improving the surface. (L10, G18, Cr)

655-L. How to Apply Metal to Glass and Ceramics. Samuel Wein. *American Machinist,* v. 96, July 7, 1952, p. 147-154.

Special report on procedures, equipment, and applications.
(L general)

656-L. Report of Committee B-8 on Electrodeposited Metallic Coatings. *American Society for Testing Materials,* Preprint 14, 1952, 6 pages.

Recommendations for revisions in standards. (L17, S22)

657-L. Report of Committee D-12 on Soaps and Other Detergents. *American Society for Testing Materials,* Preprint 41, 1952, 16 pages.

Recommended revisions of specifications, standards, and test methods. Includes surface and interfacial-tension determinations, and tests on metal-cleaning agents. (L12)

658-L. Special Protective Finishes Essential for Farm Tractors. Byron F. Campbell. *Automotive Industries,* v. 107, July 1, 1952, p. 34-36, 76, 78, 80, 82.

Corrosion testing of panels with various coatings, against agricultural chemicals; cleaning; painting; and drying. Layout diagram and photographs. (L general, R8)

659-L. Automatic Finishing for Auto Parts. H. N. Acker. *Canadian Metals,* v. 15, June 1952, p. 46-47.

Finishing operations at Canadian Motor Lamp Co., Ltd., Windsor, Ont. Brass and steel items are Cr-Ni plated; and lamp parts are Cr-Ni plated, black enameled, and given an Al-vapor coating.
(L17, Cr, Ni, Al, Cu, ST)

660-L. Effect of Addition Agents on Copper Deposition in a Convection-Free System. R. C. Turner and C. A. Winkler. *Canadian Journal of Chemistry,* v. 30, July 1952, p. 507-514.

Effects of gelatin and chloride ion on deposition in a convection-free system were similar in most respects to those observed when convection currents were present. Gelatin concentrations up to and including 250 mgm. per liter and chloride concentrations of 4 and 45 mgm. per liter had no effect on concentration polarization. 12 ref. (L17, Cu)

661-L. New Plating Process for Aluminum. *Electrical Manufacturing,* v. 50, July 1952, p. 117-118.

Brief account of NBS method using an organic plating bath. Photomicrographs. (L17, Al)

662-L. Testing for Enamel Coating Discontinuities. Stanley C. Orr. *Finish,* v. 9, July 1952, p. 23-26, 63-64.

Various methods, including instrumental procedures. Schematic diagrams. (L27, S15)

663-L. Mechanical Handling Simplifies Parts Finishing. *Iron Age,* v. 170, July 3, 1952, p. 122-124.

Plant practice at Ashtabula Bow Socket Co., Ashtabula, Ohio, stressing mechanical handling in its cleaning and painting jobs. Photographs. (L12, L26, A5)

664-L. Platers Show New Products and Methods to Minimize Shortages. *Iron Age,* v. 170, July 3, 1952, p. 125-127.

Some exhibits and papers presented at the 39th Annual Electroplaters Convention held in Chicago, June 16-19, 1952. Some methods and products discussed are white brass plating, vacuum metallizing of Al, heavy Rh plating and possible plating alternates. (L17)

665-L. Developments in the Al-Fin Process. *Machinery* (London), v. 80, June 12, 1952, p. 1024-1027.

British application of U. S. process for bonding Al and its alloys to cast iron and steel. Al-fin bonded cylinders for air-cooled engines, bimetallic pistons, bimetallic brake drums, testing Al-fin brake drums, Al-alloy steel-backed bearings, bondings as an aid to corrosion resistance, gas-turbine compressor blades, and production of hydraulic manifolds. (L22, Al, CI, ST)

666-L. Radiometric Determination of the Efficiency of Water Displacement From Phosphated Surfaces. Stanley L. Eisler. *Organic Finishing,* v. 13, June 1952, p. 19-21.

Experimental procedure. Results of experiments on ten different water-displacing, rust-preventive compounds on steel panels. One of the compounds which was very good when tested on sand-blasted panels proved inferior when tested with phosphated panels. This demonstrates that it is not possible to extend results from one test condition to the other. (L14, ST)

667-L. Requirements of Clear Finishes for Chrome Plating. Arthur L. Phillips. *Organic Finishing,* v. 13, June 1952, p. 22-23, 27.

A two-coat, clear finish has been developed. Test results indicate that many of the problems of formulating a satisfactory organic automotive coating for Cr plating have been solved. (L26, Cr)

668-L. Glass Fiber Protects Tank Bottoms. Carl G. Danielson. *World Oil,* v. 135, July 1, 1952, p. 226, 230.

Coal tar and plastic are also used in mat to reduce corrosion, avoid replacement, and save steel. (L26, ST)

669-L. (French.) Oxyacetylene Flame Cleaning. Process for Preparation of Metallic Surfaces Before Painting. L. Mendel. *Revue de la Soudure; Lastijdschrift,* v. 8, No. 2, 1952, p. 68-79.

Various methods, with emphasis on flame cleaning. Advantages and procedures of this method. 10 ref. (L10)

670-L. (German.) Interpretation of Etch Patterns in Etching and Chemical Polishing of Aluminium. A. Politycki and H. Fischer. *Zeitschrift für Electrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Apr. 1952, p. 326-330; disc., p. 330.

Pattern caused by etching on aluminum. Reason for noncubic patterns. Micrographs. (L12, Al)

671-L. (German.) Anodic Polishing of Brass and Copper. Horst Muhlberger. *Zeitschrift für Metallkunde,* v. 43, May 1952, p. 142-146.

Various experimental conditions which affect anodic polishing, particularly importance of the viscous layer, and influence of bath agitation. Optimum plant arrangements and production data. Micrographs, graphs, and diagram. (L19, Cu)

672-L. Economics of Industrial Maintenance Painting. Robert R. Pierce. *Corrosion* (Technical Section), v. 8, May 1952, p. 178-182.

Data are based on results of a continuing research program, initiated by the Corrosion Engineering Products Dept., Pennsylvania Salt Mfg. Co., to determine factors and materials which promote maximum protective life in chemical industrial painting. Determinations were conducted within three major chemical manufacturing plants, widely divergent geographically, in 14 different environments. Wire-brushed, corroded, and blasted surfaces were examined. Tables, graphs, and illustrations. (L26, R11)

673-L. P. R. Plating; an Assessment of the Present Position. *Electroplating and Metal Finishing,* v. 5, July 1952, p. 219-221. (L17)

674-L. Sprayed Metal Coatings for the Protection of Steel Against Corrosion. J. C. Hudson. *Electroplating and Metal Finishing,* v. 5; *Metal Spraying,* v. 2, July 1952, p. 241-245, 247.

Performance of protective sprayed metal coatings in exposure tests, the value of thickness testing for specification purposes, and the painting of sprayed metallic coatings. Tables and graphs. (L23, ST)

675-L. Patent Law in the Metal Finishing Industry. Albert Woodruff Gray. *Metal Finishing,* v. 50, July 1952, p. 46-48.

Various examples of legal actions. (L general, A6)

676-L. A Metal Cleaning Test Using Radioactive Stearic Acid as Oil. J. W. Hensley, H. A. Skinner, and H. R. Suter. *Metal Finishing,* v. 50, July 1952, p. 49-52.

Procedures for producing a uniform, reproducible, abraided surface on steel test pieces, and for applying very thin, uniform, and highly reproducible films of tagged stearic acid to the surface of metal test disks. Special apparatus used in preparation and coating of metal test pieces. Cleaning-test data showing removal from steel of stearic acid soil by single-component alkali solutions, with variation in cleaning time and solution concentration, and

by one organic detergent solution, with variation in cleaning time. (To be concluded.) (L12, ST)

677-L. Chromium Plating With the Bornhauser Chrome Solution. Frank Taylor. *Metal Finishing,* v. 50, July 1952, p. 53-56, 64.

Developed primarily for direct Cr plating of Zn-base die-castings, the Bornhauser solution is characterized by the presence of sodium tetrachromate as a principal constituent and is operated at lower temperature and higher current density than the conventional bath. The deposit is dull and gray but it is soft and fairly easily polished to a luster approaching that of normal bright Cr. In comparison with conventional bright Cr-plating solution, throwing power and cathode efficiency are much better and soundness and corrosion resistance are superior. (L17, Cr)

678-L. A Modern, Efficient Plating and Polishing Plant. Fred M. Burt. *Metal Finishing,* v. 50, July 1952, p. 57-63.

Crown City Plating Co., Pasádena, Calif., equipment and procedures. (L17)

679-L. New Aluminum-Plating Process. *Metal Finishing,* v. 50, July 1952, p. 63-64.

See abstract of "A Hydride Bath for the Electrodeposition of Aluminum," Dwight E. Couch and Abner Brenner, *Journal of the Electro Chemical Society;* item 592-L, 1952. (L17, Al)

680-L. Buffing Compounds. H. K. Hunt. *Metal Finishing,* v. 50, July 1952, p. 65-66.

Some physical and chemical properties of the finished material which are common to all buffing compositions, whether they be for buffing metals or nonmetals. Applicabilities to various types of metal. (L10)

681-L. Quantitative Measurement of Adhesion of Electrodeposited Metals. H. C. Schlaupitz and W. D. Robertson. *Plating,* v. 39, July 1952, p. 750-753, 764.

The problem of measuring adhesion; tests proposed and evaluated; technique is demonstrated. Tables and diagrams. (To be continued.) (L17)

682-L. Tentative Recommended Practice for Preparation of Zinc-Base Die Castings for Plating. *Plating,* v. 39, July 1952, p. 759-761.

Recommendations of ASTM tentative standard B252-51T, 1951. (L17, Zn)

683-L. Polarization and Overvoltage: Selected Bibliographical Abstracts. Ralph A. Schaefer and William King. *Plating,* v. 39, May 1952, p. 487-494; June 1952, p. 627-634; July 1952, p. 769-780.

American Electroplaters' Society Research Project No. 8. Brief foreword and introduction, and abstracts covering years 1875-1951. Latter were selected to include the important researches in the above field as they relate to electrodeposition and allied fields. (L17, P15)

684-L. Choice of Plates or Painted Finish for Die Cast Zinc Surfaces. *Precision Metal Molding,* v. 10, July 1952, p. 46-47, 49, 53, 65.

Reviews the plating and painting cycles being employed by a manufacturer of kitchen appliances. (L17, L26, Zn)

685-L. Finishing Commercial Trucks at Reo Motors, Inc. Bryant W. Pocock. *Products Finishing,* v. 16, July 1952, p. 20-26, 28.

(L general, T21, ST)

686-L. Nikon Finishing Methods Stress Quality. Ezra A. Blount. *Products Finishing,* v. 16, July 1952, p. 32-34, 36.

Finishing methods for Japanese-made cameras. Base metals are Al and brass. Coated with various metals and nonmetals. (L general, Al, Cu)

687-L. Britehoning of Plumbing Parts Effects Large Savings. Herbert Chase. *Products Finishing,* v. 16, July 1952, p. 38-40, 42.

Installation of two wet barrels with accessory equipment avoids high costs of polishing on cast and screw-machine brass products, at American Radiator & Standard Sanitary Corp. (L10, Cu)

688-L. Spotlighting Finishing Progress. Allen G. Gray. *Products Finishing,* v. 16, July 1952, p. 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82.

Reviews of recent literature on protection of steel against atmospheric corrosion, regeneration of chromic acid solutions, and low-pressure spraying of porcelain enamels. (L general)

689-L. Some Aspects of the Manufacture of Sheet Steel for Vitreous Enamelling. E. Marks. *Sheet Metal Industries,* v. 29, July 1952, p. 587-592.

What recent changes in sheet manufacture mean to the enameler, and why they result in a product more trouble-free in enameling. Photographs and graphs. (L27, D general, F23, ST)

690-L. The Mechanical Surface Finishing of Metals. (Continued.) G. T. Colegate. *Sheet Metal Industries,* v. 29, July 1952, p. 645-650.

Polishing materials—methods of applying; choice of compound; bind-

ing media; and abrasives. Tables. (To be continued.) (L10)

691-L. Discussion on "The Finishing of Motor-Car Bodies." *Sheet Metal Industries,* v. 29, July 1952, p. 651-656.

Discussion at the Spring 1952 meeting of S.A.S.M.U.T.A. in London where various processes and problems were considered, including phosphating, Bonderizing, and painting. (L14, L26, ST)

692-L. Blast Cleaner Speeds Casting Flow. *Steel,* v. 131, July 7, 1952, p. 95.

Cleaning of castings at Eclipse Lawn Mower Co., Prophetstown, Ill. (L10)

693-L. Coating Extends Pipe Life. *Steel,* v. 131, July 7, 1952, p. 98, 100.

Use of porcelain enamel prolongs black-steel pipe life 12-20 times in Al fluxing and degassing operations. (L27, E25, Al, ST)

694-L. Hot Dip Aluminizing Affords Protective Surface. J. B. Russell. *Steel,* v. 131. July 14, 1952, p. 100, 102.

Coating applied by continuous process resists oxidation and scaling at elevated temperatures. Beryllium minimizes oxidation of bath and produces a high-luster surface. Effects on mechanical properties. (L16, Q general, Al)

695-L. Wire Brushing Shows 60 to One Production Gain Over Hand Work. Frank B. Hunter. *Western Metals,* v. 10, June 1952, p. 42-43.

Experiences of Wm. R. Whittaker Co., Los Angeles, in production of a specific part. (L10)

696-L. Complex Stainless Parts Resist Corrosion When Electropolished. George L. Shriver. *Western Metals,* v. 10, June 1952, p. 51-52.

How electropolishing achieves a smooth, lustrous surface by cutting down the high spots on the surface of the metal to make a smoother plane. Resulting chemically pure surface increases corrosion resistance in the 400 series stainless steels under ordinary operating conditions by nearly 450% and in the 300 series by 750%. (L13, R general, SS)

697-L. An Analysis of Metal Coatings. R. A. Schaus. *Western Metals,* v. 10, June 1952, p. 56-59.

Several processes which offer corrosion resistance to specific media and can be applied to a variety of shapes of steel articles. The principal metal coatings used are Zn, Sn, Pb, Cu, Cr, Si, Al and stainless steel. (L general, ST)

698-L. Coating Metal Used in Hot-Dip Galvanizing. Parts III-IV. (Concluded.) Wallace G. Imhoff. *Wire and Wire Products,* v. 27, June 1952, p. 575-578, 630; July 1952, p. 686-689, 692.

Three classes of metals that are added to baths to achieve certain objectives in coatings—namely, the very common metals such as Al, Sn, Sb, Cu, and Cd; various metals such as Ni, Cr, Mg, Bi, As, W, and alloys of Si and Mn; and mixtures of the above. July installment: Coating qualities resulting from different galvanizing bath compositions. (L16, Zn, CN)

699-L. Symposium: Mechanical Cleaning of Rods and Wire. William M. Baldridge, E. T. Miller, and Floyd M. Hauger. *Wire and Wire Products,* v. 27, July 1952, p. 672-675, 709-711.

Round-table discussion. (L10)

700-L. (Book) **Handbuch der Metallbeizerei. Eisenwerkstoffe.** (Handbook of Metal Etching. Ferrous Metals.) Ed. 2. Hermine Vogel and Alfred Keller, editors. 538 pages. 1951. Verlag Chemie, G.m.b.H., Weinheim-Bergstrasse, Germany.

A comprehensive treatise on etching and pickling of iron and steel, in theory and practice. Covers all chemical surface treatments. Numerous tables, graphs, diagrams, photomicrographs, footnote references, etc. (L12, Fe, ST)

701-L. Ceramics Shield Stainless for Jets. Robert G. Hicks. *American Machinist,* v. 96, July 21, 1952, p. 99-100.

Experiments of Stewart-Warner's South Wind Div. on methods of applying several coatings, particularly in jet-engine components. Some results are: doubled metal life at jets when coated properly, minimum intergranular corrosion of some alloys at 1600-2100° F., and proof that coat thickness should range around 0.001-0.003 in. (L27, SS)

702-L. Ceramics Make Furnace Fixtures Last Longer. D. K. Krosch. *American Machinist,* v. 96, July 21, 1952, p. 101.

Temperature-resistant coatings extend fixture life 4-5 times at Solar Aircraft Co. (L27, SG-h)

703-L. How Aluminum Bonding Is Keyed to Production. William M. Stocker, Jr. *American Machinist,* v. 96, July 21, 1952, p. 108-111.

The steel surface to be coated is machined and cleaned, then the steel is placed in molten aluminum to be "tinned"—which actually creates an Al-Fe alloy surface. After this, the part is placed in a mold and molten Al is poured around it. How Continental Motors Corp. designed the process into its cylinder-head production line. (L15, Al)

704-L. Ceramics Ease Metal Shortage. John V. Long. *Automotive Industries*, v. 107, July 15, 1952, p. 40-41, 76, 78, 80, 82.

Application of new series of ceramic coatings for high temperatures developed by Solar Aircraft Co. for protection of stainless steels and high-temperature alloys, especially Type 321. (L27, SS)

705-L. Electroplating in Industry. Donald B. McPherson. *Canadian Metals*, v. 15, July 1952, p. 38-39.

Applications of Cr and Ni plating. (L17, Cr, Ni)

706-L. Deposition of Conducting Films on Glass. *Chemical Age*, v. 67, July 5, 1952, p. 13-15.

Compares British and American work. (L general)

707-L. The Plating of Aluminium Articles; Electrodeposition as a Production Process. *Chemical Age*, v. 67, July 5. 1952, p. 23-27. (Based on article by A. W. Wallbank.)

Previously abstracted from *Electrodepositors' Technical Society*. Advance Copy 7, 1952. See item 479-L, 1952. (L17, Al, Ni, Zn, Cu)

708-L. Painting Earth Moving Vehicles. Walter Rudolph. *Industrial Finishing*, v. 28, July 1952, p. 32, 34, 36, 38.

Cleaning and finishing operations at Euclid Road Machinery Co., Cleveland. (L26, ST)

709-L. How Ten Operations Assure Quality in Hot-Dip Tinning. Clayton M. Wright. *Industrial Gas*, v. 31, July 1952, p. 3-4, 23-24.

Job-tinning plant of Wright Metalcoaters Inc., South Hackensack, N. J., handles individual parts which vary from 46,000 per lb. to 100 lb. each. Six lines of equipment turn out work calling for tolerances of 0.0001-0.0003 in. coating. (L16, ST, Sn)

710-L. Phosphoric Acid Treatment Improves Paint Adherence, Corrosion Resistance. W. G. Patton. *Iron Age*, v. 170, July 17, 1952, p. 138-139.

The Nielizing process for corrosion control and its use in ferrous metal pre-paint conditioning. This process uses a phosphoric acid base. (L26, Fe)

711-L. Uses for Industrial Coated Abrasives Expanded. Part 1. John E. Hyler. *Iron Age*, v. 170, July 24, 1952, p. 98-101, July 31, 1952, p. 91-95.

A number of different types of coated abrasives, their uses and recent improvements. Part II. Uses of backstand equipment. Abrasive-belt equipment for tool-grinding, centerless grinding, polishing of metal sheet and strip. (L10)

712-L. Wash Primer Helps Industry Fight Corrosion. R. A. Garling. *Iron Age*, v. 170, July 24, 1952, p. 102-107.

A vinyl-resin prime coat developed during World War II for marine uses which has since been adapted to other surfaces. The complex reaction responsible for its bonding properties. (L26, ST)

713-L. Automatic Acid Bright Dip Has Many Advantages. K. W. Bennett. *Iron Age*, v. 170, July 24, 1952, p. 108-110.

The continuous bright-dip machine operated by Bastian-Blessing Co., Chicago, for cleaning of small brass parts. Unit output and floor plan. (L12, Cu)

714-L. The Electropolishing of Nickel in Urea-Ammonium Chloride Melts. T. P. Hoar and J. A. S. Mowatt. *Journal of the Electrodepositors' Technical Society*, v. 26, 1950, p. 7-25, disc., p. 35-41.

Previously abstracted from Advance Copy 1, 1950; item 335-L, 1950. (L13, Ni)

715-L. The Commercial Electrolytic Polishing of Stainless Steels. P. A. Charlesworth. *Journal of Electrodepositors' Technical Society*, v. 26, 1950, p. 43-53; disc., p. 63-70.

Previously abstracted from Advance Copy 2, 1950; item 336-L, 1950. (L13, SS)

716-L. New Developments of Electrolytic Polishing. H. E. Zentler-Gordon. *Journal of the Electrodepositors' Technical Society*, v. 26, 1950, p. 55-62; disc., p. 63-70.

Previously abstracted from Advance Copy 3, 1950; item 337-L, 1950. (L13, CN, SS, Cu, Al)

717-L. The Electrodeposition of Copper-Cadmium Alloys From Cyanide Solutions. E. E. Longhurst. *Journal of the Electrodepositors' Technical Society*, v. 26, 1950, p. 71-89; disc., p. 125-135.

Previously abstracted from Advance Copy 5, 1950; item 338-L, 1950. (L17, Cu, Cd)

718-L. The Electrodeposition of Tin-Cadmium Alloys. P. S. Bennett. *Journal of the Electrodepositors' Technical Society*, v. 26, 1950, p. 91-98; disc., p. 125-135.

Previously abstracted from Advance Copy 6, 1950; item 339-L, 1950. (L17, Cd, Sn, ST)

719-L. Further Work on the Electrodeposition and Properties of Speculum. P. S. Bennett. *Journal of the Electrodepositors' Technical Society*, v. 26, 1950, p. 107-118; disc., p. 125-135.

Previously abstracted from Advance Copy 7, 1950; item 340-L, 1950. (L17, Cu)

720-L. The X-Ray Structure of Speculum Electrodeposits. H. P. Rooksby. *Journal of the Electrodepositors' Technical Society*, v. 26, 1950, p. 119-124; disc., p. 125-135.

Previously abstracted from Advance Copy 8, 1950; item 341-L, 1950. (L17, M22, Cu)

721-L. Studies in the Discontinuities in Electrodeposited Metallic Coatings. U. R. Evans and S. C. Shome. *Journal of Electrodepositors' Technical Society*, v. 26, 1950, p. 137-160; disc., p. 161-167.

Previously abstracted from Advance Copy 9, 1950; item 342-L, 1950. (L17, Ni, Co, Cu, Cr)

722-L. The Electrodeposition of Tin From Stannous Fluoborate Baths. N. Parkinson. *Journal of the Electrodepositors' Technical Society*, v. 26, 1950, p. 169-176; disc., p. 177-179.

Previously abstracted from Advance Copy 10, 1950; item 343-L, 1950. (L17, Sn)

723-L. The Etching of Aluminium for Direct Plating With Other Metals. J. M. Bryan. *Journal of the Electrodepositors' Technical Society*, v. 26, 1950, p. 181-186; disc., p. 187-190.

Previously abstracted from Advance Copy 11, 1950; item 344-L, 1950. (L17, Al, Ni, Cu)

724-L. "Emulsion" Cleaning of Metals. G. Schmerling. *Journal of the Electrodepositors' Technical Society*, v. 26, 1950, p. 191-198; disc., p. 207-212.

Previously abstracted from Advance Copy 12, 1950; item 345-L, 1950. (L12)

725-L. Surface Active Agents in the Improvement of the Cleaning of Metals. R. C. Tarring. *Journal of the Electrodepositors' Technical Society*, v. 26, 1950, p. 199-206; disc., p. 207-212.

Previously abstracted from Advance Copy 13, 1950; item 346-L, 1950. (L12)

726-L. Interpretation of Specifications for Electroplated Coatings. S. Wernick. *Journal of the Electrodepositors' Technical Society*, v. 26, 1950, p. 221-227; disc., p. 227-235.

Problems in establishment of specifications fair to both consumer and producer. Determination of thickness of deposits; microstructure; adhesion and porosity; and performance specifications. (L17, S22)

727-L. A Fast Phosphating Process. *Machinery Lloyd*, (Overseas Ed.), v. 24, July 5, 1952, p. 103-104.

The Walterisation "PHO" process and a new development of it, the "E" process, which enables extension to mass-production work such as the manufacture of vehicles, aircraft, and shipping where a strongly corrosion resistant coating is essential. (L14)

728-L. Surface Finishes Improve Performance of Technical Ceramics. Hans Thurnauer. *Materials & Methods*, v. 36, July 1952, p. 88-91.

Various finishing methods which can significantly add to the service performance of technical ceramics. Ceramic glazes, moisture-repellent treatments, grinding for precision, polished ceramics, controlled surface roughness, and metallic coatings. (L general)

729-L. Source of Hydrogen in Porcelain-Enameled Steel. *Metal Progress*, v. 62, July 1952, p. 148, 150. (Condensed from "Relative Importance of Various Sources of Defect-Producing Hydrogen Introduced Into Steel During the Application of Porcelain Enamels", Dwight G. Moore, Mary A. Mason, and William N. Harrison.)

Previously abstracted from *Journal of the American Ceramic Society*. See item 168-L, 1952. (L27, ST)

730-L. Stainless-Steel Applied Liners. Helmut Thielsch. *Welding Journal*, v. 31, July 1952, p. 321s-337s.

Review of published and unpublished information on welding procedures used in the fabrication of applied liners; heat treatments, testing procedures, and code requirements. 68 ref. (L24, SS, ST)

731-L. Fourteen Hundred Dollars Saved in Eight Hours. *Welding Journal*, v. 31, July 1952, p. 595.

Metallizing repair of worn Monel shaft used by a New York harbor tugboat. (L24, Ni)

732-L. Bonderizing for Wiredrawing. The Application of Bonderizing in Needle Wire Production. N. J. Strasser. **The Application of Bonderizing in Section Drawing.** H. F. Sanderson. **Some Production Experiences With Bonderizing for Cold Drawing of Steel Wire.** W. Holloway. *Wire Industry*, v. 19, July 1952, p. 635-645.

An introductory discussion is followed by consideration of specific applications of bonderizing. (L14, F28, ST)

733-L. (English.) Some Factors Influencing the Adhesion of Films Produced by Vacuum Evaporation. O. S. Heavens. *Centre National de la Recherche Scientifique*, "Les Proprietes Optiques des Lames Minces Solides", 1950, p. 51-55; disc., p. 55-56.

Results of influence of Cr on adhesion of Ag and Al to glass. (L25, Ag, Al)

734-L. (French.) An Apparatus for Cathodic Sputtering Permitting Production of Layers of Controlled Den-

sity During Formation. A. Andant. *Centre National de la Recherche Scientifique,* "Les Propriétés Optiques des Lames Minces Solides", 1950, p. 47-48.

The optical density of the deposits is measured during sputtering (a beam of light passes through the target plate and the metallic cathode which is perforated for this purpose.) The apparatus also provides control of the purity of the gas in the region where the sputtering takes place. (L25, P17)

735-L. (French.) **Vacuum Evaporation Apparatus for Metallization of Interferometric Films.** J. Roig and Descamps. *Centre National de la Recherche Scientifique,* "Les Proprietes Optiques des Lames Minces Solides", 1950, p. 59-61; disc., p. 61.

For deposition of Ag and Al. Characteristic features are diagrammed. (L25)

736-L. (French.) **Protection of Optical Glasses and Aluminized Mirrors.** Flamant. *Centre National de la Recherche Scientifique,* "Les Propriétés Optiques des Lames Minces Solides", 1950, p. 76-80.

Behavior of films used for increasing or decreasing the reflectivity of glass, and of films likely to be used for protection of metallic deposits, when they are exposed to an atmosphere containing sea air, at 35° C., during a time sufficient to cause deterioration. The fluorides used either as protecting films or for anti-reflection treatment had poor resistance. Silicon and SiO are practically unalterable when deposited on glass. They give the best protection for reflecting surfaces of metallic Al. But this protection disappears because of cracking. TiO_2 and Al_2O_3 films are also discussed. (L25, P17, R3, Al)

737-L. (French.) **Electropolishing of Al-Si-Fe for Micrographic Examinations.** G. Meynet and R. Assibat. *Revue de l'Aluminium,* v. 29, May 1952, p. 180-182.

By cutting to a minimum the duration of electropolishing and by using an electrolyte composed of perchloric acid, ethyl alcohol, and butycellosolve, electropolishing of light-alloy test samples containing Si was achieved without corrosion of the silicon lamellas. (L13, Al)

738-L. (French.) **Chromium-Plated Aluminum Engine Cylinders. Work of Mahle Firm.** E. Meyer Rässler. *Revue de l'Aluminium,* v. 29, May 1952, p. 200-204.

Work of German firm. Micrographic studies of the Al-plated surfaces are illustrated. 10 ref. (L17, M27, Al, Cr)

739-L. (French.) **Experimental Apparatus for Determination of Adhesion of Varnish to the Base. Variation of Adhesion in Relation to Condition of the Metal Surface. Experimental Results.** Otto Cuzzer, Carlo Pizzuto, and Licio Caccavo. *Revue de Métallurgie,* v. 49, June 1952, p. 423-435.

The apparatus used. Typical results are analyzed and interpreted. Data are charted for adhesion of various coatings to different ferrous and nonferrous metals and alloys. Micrographs. (L26)

740-L. (French.) **Anodic Protection of Light Alloy Construction.** G. Moressée. *Soudure et Techniques connexes,* v. 6, May-June, 1952, p. 123-128.

Treatment of resistance welded pieces to assure their protection against corrosion: anodic oxidation, sulfuric acid, and chromic acid processes. Includes tabular data. (L19, Al)

741-L. (German.) **Experiments on Protective-Gas Annealing, Instead of Pickling, in Sheet-Steel Enameling.** W. Kerstan. *Berichte der Deutschen Keramischen Gesellschaft e. V und des Vereins Deutscher Emailfachleute e.V.,* v. 29, Mar. 1952, p. 81-87.

Experiments revealed great advantages over pickling. Photographs, tables, and photomicrographs. (L27, J23, ST)

742-L. (German.) **Measurements and Photographing of Anodically and Chemically Polished Pure Aluminum Surfaces.** W. Helling and F. Baumann. *Metall,* v. 6, July 1952, p. 346-350.

Measuring and representation of the polishing effect. Details of the experiments. Diagrams, optical and electron micrographs, and interference patterns. (L12, L13, M27, Al)

743-L. (German.) **Treatment of Zinc Waste in Hot-Dip Galvanizing.** R. Haarmann. *Metall,* v. 6, July 1952, p. 363-369.

Possibilities for economizing on Zn consumption. Treatment of Zn residues, melting of Zn beads, treatment of slag, and of hard Zn. Graphs and micrographs. (L16, Zn, CN)

744-L. (German.) **The Porosity of "Eloxidized" Layers.** Oswald Kubaschewski and Arvid von Krusenstjern. *Metalloberfläche,* ser. A, v. 6, July 1952, p. A97-A102.

The protective effect of various oxide coatings, and the formation of macropores and micropores in anodizing of pure Al. Various methods for judging the porosity of a layer. Micrographs. (L19, Al)

745-L. (German.) **Galvanizing in the United States of America.** *Stahl und Eisen,* v. 72, July 3, 1952, p. 805-833.

Three articles plus accompanying discussion: "Hot Dip Galvanizing of Tubes", Rolf Haarmann; "American Methods of Zinc Coating Steel Wire and Steel-Wire Products", Peter Hillesheim; and "Galvanized Sheet and Strip", by Wilhelm Brachmann. (L16, Zn, CN)

746-L. (German.) **Processing and Measuring Methods in the Surface-Finishing Industry.** J. Ickert. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, July 1, 1952, p. 663-665.

Equipment for electroplating, paint application, roughness and hardness measurement, and automatic flame hardening. 19 ref. (L17, L26, J2, S15, Q29)

747-L. (Russian.) **Impregnation of the Surface of Steel by Vanadium From Gaseous Media.** G. N. Dubinin. *Doklady Akademii Nauk SSSR,* new ser., v. 84, May 11, 1952, p. 269-272.

Iron (0.03% C) and steel (0.1-1.2% C) were vanadium impregnated by means of VCl_2 vapor in a stream of H_2 at temperatures from 800 to 1300° C. Results are tabulated, charted, and illustrated. (L15, Fe, CN)

748-L. Titanium-Dioxide Rectifiers. *Canadian Chemical Processing,* v. 36, July 1952, p. 72.

By forming a layer of TiO_2 on a sheet of Ti and then applying a counterelectrode to the oxide surface, the new rectifiers are prepared. Two processes have been devised to form the oxide layer. One process involves heating the Ti metal first in O_2 and then H_2. The other consists in heating it in steam at elevated temperatures. (L14, T1, Ti)

749-L. Aeronautical Ceramics. Thomas A. Dickinson. *Ceramic Age,* v. 60, July 1952, p. 15-16, 18.

Chiefly methods of application of ceramic coatings to metal. (L27)

750-L. New Bath Refines Aluminum Uses. *Chemical Engineering,* v. 59, July 1952, p. 268.

New type of organic plating bath which provides dense, ductile deposits of the metal, suitable for a number of exacting applications not possible before. (L17, Al)

751-L. Enameling of Aluminum. C. R. Sigler. *Finish,* v. 9, Aug. 1952, p. 35-37, 56-57.

Previously abstracted from *Ceramic Industry,* item 775-L, 1951. (L27, Al)

752-L. 4 Times the Life for Shears That Cut Metal 2¾ In. Thick. *Inco Magazine,* v. 25, no. 3, 1952, p. 10.

Blades were faced with easily deposited alloy (Hastelloy C) that work-hardens in service to increase its wear resistance. (L24, T5, Ni)

753-L. The Use of Alkalis in Cleaning Processes. Part 2. P. G. Clements and T. Kennedy. *Industrial Chemist and Chemical Manufacturer,* v. 28, July 1952, p. 301-305.

Effect of alkaline detergents on a wide variety of materials of construction, both metallic and nonmetallic. 13 ref. (L12)

754-L. Efficiency of Hard Facing Operation Increased by 75%. *Industry & Welding,* v. 25, Aug. 1952, p. 33-34, 58.

Use and advantages of automatic submerged-arc welding for hard facing coal-crushing equipment, at Cleveland Electric Illuminating Co. A high-alloy electrode is used on 0.45% C steel. (L24, CN)

755-L. Power Brushing Solves Many Weld Finishing Problems. *Industry & Welding,* v. 25, Aug. 1952, p. 54-56, 58.

Illustrated examples; selection of correct brush. (L10)

756-L. Rust Inhibitor Hosed on Large Steel Parts. *Iron Age,* v. 170, July 31, 1952, p. 98-100.

Prepainting process at Cleveland-Cadillac Tank plant in which a new solvent is used to combine three operations in one to remove grease and tar, clean chips, and produce a rust-inhibitive phosphate coating. (L14, L12, ST)

757-L. Get More Coverage With Electrostatic Painting. *Iron Age,* v. 170, Aug. 7, 1952, p. 116-117.

More than three times the number of chairs per gal. of paint is the record of ChromCraft Div., American Fixture & Mfg. Co., St. Louis. Equipment and procedures. (L26)

758-L. Electrolytic Titanium. Abner Brenner and Seymour Senderoff. *Journal of the Electrochemical Society,* v. 99, Aug. 1952, p. 223C-224C.

Preliminary findings in the problem of finding an electrolytic method for producing Ti electrodeposits or Ti powder. Micrographs. (L17, H10, Ti)

759-L. Factors Influencing the Design of Automatic Plating Plant. A. Smart. *Journal of the Electrodepositors' Technical Society,* v. 27, 1951, p. 277-288; disc., p. 289-291. (Preprint.)

The various steps in the design of one rather large installation for electrogalvanizing steel window frames. (L17, Zn, CN)

760-L. Hot Dip Galvanizing. *Metal Industry,* v. 81, July 11, 1952, p. 23-25.

Report on Second International Conference on Hot Dip Galvanizing, Düsseldorf, Germany, comprises two papers accompanying discussion; "The Ductility of Hot Dip Galvanized Coatings", H. Bablik; and "The Flaking of Hot Dipped Zinc Coatings", M. L. Hughes. (L16, Zn, CN)

761-L. Zinc Coating — Galvanizing Baths. *Metal Industry,* v. 81, July 18, 1952, p. 51-52.

Second part of report on 2nd International Conference on Hot-Dip Galvanizing, Dusseldorf, Germany. Briefly reports on two papers and accompanying discussion: "The Potential Behaviour of the Iron-Zinc Alloy Layer of Galvanized Steel in Various Hot Aqueous Solutions", R. C. Weast; and "The Effect of Aluminium and Iron on the Structure of Galvanized Coatings", M. A. Haughton. (L16, M27, R5, Zn, CN)

762-L. The Hardness of Chromate Films; an Investigation of Chromate Passivated Cadmium Plate. A. J. W. Beck. *Metal Industry,* v. 81, July 25, 1952, p. 69-70.

(L14, L17, Cd)

763-L. Chromium Plating Baths Containing Fluorides or Fluosilicates. T. A. Hood. *Plating Notes,* v. 4, Apr. 1952, p. 31-45.

Previously abstracted from *Metal Finishing,* item 572-L, 1952. (L17, Cr)

764-L. Thin Metal Films — New Methods for Their Production. Richard B. Belser. *Research Engineer* (Georgia Institute of Technology), v. 1; May 1952, p. 7-8, 21-24.

New methods of film-forming and some modern applications using Au, Cu, Sn, Zn, Pd, Pb, Cd, Ag, Pt, Al, Ni, Ti, Zr, Cr, and In. Photomicrographs. (L25)

765-L. Evaporation of Silver From Electroplated Heating Elements. Lawrence A. Howard and Charles M. Berntson. *Review of Scientific Instruments,* v. 23, July 1952, p. 383.

A method of holding silver for electrical melting in the evaporation of that metal on surfaces of differing shapes and sizes. (L25, N16, Ag)

766-L. Automatic Brushing Speeds Gear Cleaning. *Steel,* v. 131, Aug. 4, 1952, p. 94-95.

Unskilled worker using machine brushing setup keeps up with pace set by modern gear cutters. Gear finishing is stepped up from 20 to 125 per hr. (L10, G17)

767-L. (French.) **Electropolishing of Brass.** Jean Daurat. *Métallurgie et la Construction Mécanique,* v. 84, May 1952, p. 363, 365; June 1952, p. 461.

The process, its applications, and measurement of brightness by a reflectometer. (L13, P17, Cu)

763-L. (German.) **Instructions for Painting of Aluminum in Shipbuilding.** J. Reiprich. *Aluminium,* v. 28, July-Aug. 1952, p. 248-250.

(L26, Al)

769-L. How to Select Abrasives for Blast Cleaning Metals. V. F. Stine. *American Foundryman,* v. 22, Aug. 1952, p. 39-41.

Selection of best abrasive considered in terms of four primary factors; type of metal to be cleaned; shape of the part; kind of material to be removed; and surface finish desired. (L10)

770-L. A Growing Need for Clad Metals Replaces Hand Methods With a Bonding Machine. *Business Week,* Aug. 16, 1952, p. 61-62, 64, 66.

Economic and technological status of clad metals. Knapp Mills, Inc., Long Island City, N. Y., and American Cladmetals Co., Carnegie, Pa., are the principal producers. Automatic machinery which is giving ten times the output of hand welding-torch methods previously used. (L24)

771-L. Trifluorochloroethylene Polymer Resin Dispersion Films on Metal. F. E. Gusmer. *Corrosion* (News Section), v. 8, Aug. 1952, p. 1-2.

Method of surface preparation, application, and testing of this protective coating. Resistance to a variety of common chemicals and to heat was very good. (L26)

772-L. Barrel Finishing Precision Turbo-Jet Parts. Dudley J. Kaharl. *Machinery* (American), v. 58, Aug. 1952, p. 145-151.

Procedures and equipment of Pratt & Whitney Aircraft Div., United Aircraft Corp., East Hartford, Conn. Materials are steel, aluminum, stainless steel, brass, and magnesium. (L10, SS, ST, Al, Cu, Mg)

773-L. Mollerizing Iron and Steel Provides Aluminum Surfaces. *Machinery* (American), v. 58, Aug. 1952, p. 179-181.

Al can be united permanently with the surfaces of steel or iron parts, regardless of intricate shapes. The process consists of immersing the workpieces in an electrically heated salt-bath furnace after the parts have been thoroughly cleaned and pickled. The bath has a layer of molten Al on top 2-4 in. in depth. When the parts have reached the temperature of the bath, approximately 1500° F., they are held for a short period, then withdrawn through the molten Al and consequently receive a coating of Al on exposed surfaces. (L15, Al, ST, Fe)

774-L. Rebuilding Engine Cylinders and Liners; Worn Machine Surfaces Built up With Iron and Porous Chromium. Fred M. Burt. *Metal Finishing,* v. 50, Aug. 1952, p. 67-72.

Use of the "Vanderloy M" Fe plating and "Porus-Krome" processes. Micrographs show structure of the deposits. (L17, Fe, Cr)

775-L. A Metal Cleaning Test Using Radioactive Stearic Acid as Soil. Part II. J. W. Hensley, H. A. Skinner, and H. R. Suter. *Metal Finishing,* v. 50, Aug. 1952, p. 77-80, 83.

Test apparatus and procedure. Cleaning test results for removal of stearic acid films from steel, using different agents, are charted and tabulated. (L12, ST)

776-L. Protecting Metal Surfaces With Paint. Allen G. Gray. *Metal Progress,* v. 62, Aug. 1952, p. 79-81, 142, 144, 146.

Grit and shot-blasting, wire brushing, flame conditioning, chemical methods, theory of paint protection, effect of electropotential gradients, and selection of pigments. (L26)

777-L. A New Solution for the Electrolytic Polishing of Copper and Copper-Base Alloys, Particularly Tin Bronze. E. C. W. Perryman. *Metallurgia,* v. 46, July 1952, p. 55-57.

Addition of concentrated H_2SO_4 to the orthophosphoric acid solution normally used is recommended. (L13, Cu)

778-L. Barrel Finishing. III. Planning a Barrel Finishing Department. Morris S. Shipley. *Plating,* v. 39, Aug. 1952, p. 860-861.

Includes layout diagrams. (L10)

779-L. Quantitative Measurement of Adhesion of Electrodeposited Metals. (Concluded.) H. C. Schlaupitz and W. D. Robertson. *Plating,* v. 39, Aug. 1952, p. 862-864, 932.

Modified nodule method. 18 ref. (L17)

780-L. Physical Properties of Electrodeposited Metals. I. Nickel. 3. The Effect of Plating Variables on the Structure and Properties of Electrodeposited Nickel. A. Brenner, Victor Zentner, and C. W. Jennings. *Plating,* v. 39, Aug. 1952, p. 865-894, 899-927, 933.

Main objective was to accumulate data on those mechanical properties of nickel electrodeposits which are of immediate value in engineering applications. A further aim was to collect data on other properties, such as density and electrical, magnetic, and thermal properties, which may be of value in determining the suitability of Ni deposits for special applications. A subsidiary but important purpose was to correlate the physical and mechanical properties of Ni deposits with their conditions of deposition, structure, and chemical composition and to show the correlations existing between the properties themselves. Extensive tabular data, graphs, and micrographs. 209 ref. (L17, Q general, P general, M27, Ni)

781-L. Neoprene Protective Coatings. L. S. Blake. *Product Engineering,* v. 23, Aug. 1952, p. 138-139.

Neoprene rubber is now available in room-temperature curing solutions with high solids content. Applications in coatings. (L26)

782-L. Hard Chromium Coatings for Ferrous Parts. G. A. Samuel. *Product Engineering,* v. 23, Aug. 1952, p. 164-166.

English process of chromizing consists of placing parts in a carburizing box containing a Cr-rich powder and heating the sealed box in an ordinary furnace for 6-12 hr. Field of application is between those of stainless and plating, and slightly overlaps in each case. (L15, Cr, ST)

783-L. Some Newer Organic Protective Coatings. David Busker. *Product Engineering,* v. 23, Aug. 1952, p. 167-174.

Recent developments; outstanding properties of the resin-base finishes; industrial applications; specialty finishes; and strippable films. (L26)

784-L. High Operating Efficiency in Job Lot Finishing of Small Parts. Frank L. Bonem. *Products Finishing,* v. 16, Aug. 1952, p. 18-28, 30.

Facilities at Shakeproof, Inc., division of Illinois Tool Works, for finishing of such small parts as gears, screws and other fastening devices. Details of automatic Zn and Cd plating; phosphating; barrel plating with Zn, Cd, and Cu; tinning and miscellaneous finishes; washing; and maintenance and control. Photographs and layout diagram (L general, Zn, Cd, Cu, Sn, Pb)

785-L. Mica Base Paint System Increases Transformer Tank Life. J. G. Ford and A. J. Kuti. *Products Finishing,* v. 16, Aug. 1952, p. 30, 32, 34, 36.

Three-coat system as applied at Transformer Division, Westinghouse Electric Corp., Sharon, Pa. (L26, ST)

786-L. Conservation of Sulfuric Acid and Nickel Sulphate in the Pickling Department. M. H. Whitehead. *Products Finishing,* v. 16, Aug. 1952, p. 36, 38, 40, 42.

Storage, handling, use, and possible reclaiming methods. Treatment of sheet steel prior to porcelain enameling. (L12, ST)

787-L. Military Uses of Organic Finishes. *Products Finishing,* v. 16, Aug. 1952, p. 46, 48, 52, 56, 58, 60, 62, 66, 68.

Report on four talks given before the Lacquer Panel, 63rd Annual

Convention, National Paint, Varnish, and Lacquer Association. Resuirements of Ordnance and Air Force, tests for military finishes, and a table on properties of aircraft finishes. Photographs. (L26)

788-L. Electropolishing of Silver Shows Cyclic Behavior. *Products Finishing*, v. 16, Aug. 1952, p. 68, 72, 74, 78. (From paper by H. T. Francis and W. H. Colner. *Journal of the Electrochemical Society.)*

Effect of voltage regulation on the cycling observed in the anodic electropolishing of silver in cyanide solution. Circuit diagram. (L13, Ag)

789-L. Plating on Stainless Steel. *Products Finishing*, v. 16, Aug. 1952, p. 78, 80, 82.

Tentative recommended practices as developed by ASTM Committee B-8 and published in B254-51 T, issued 1951 for various electrodeposits. Covers scale removal, cleaning, and activation. (L17, SS)

790-L. Chromium-Alloy Coatings. *Products Finishing*, v. 16, Aug. 1952, p. 82, 84, 86.

Summarizes article by T. P. Hoar and E. A. G. Croom, *Journal of the Iron and Steel Institute*, (item 11-L, 1952); and an article in *Journal of the Electrochemical Society* on salt-bath chromizing studies conducted at Battelle Memorial Institute for the Air Materiel Command. (L15, CN)

791-L. The Evolution of the Modern Hot-Dip Galvanizing Pot. Wallace G. Imhoff. *Wire and Wire Products*, v. 27, Aug. 1952, p. 769-774, 828-832.

Various types of pot designs, showing progressive changes down to the present time. Graphs. 32 ref. (L16, Zn)

792-L. (Book) Elements of Ceramics. F. H. Norton. 246 pages. 1952. Addison-Wesley Press, Cambridge 42, Mass. $6.50.

Designed to cover the principles underlying the various processes used in the ceramic field, with enough illustrations to make their application clear. Emphasis is placed on unit processes. Includes chapter on enameling of metals; brief mentions of refractories. (L27, B19)

793-L. Metal-Ceramic Composites. J. H. Westbrook. *American Ceramic Society Bulletin*, v. 31, June 1952, p. 205-208; July 1952, p. 248-250.

Reviews the general field of metal-ceramic materials with respect to their history, applications, forms, properties, manufacture, and design. Underlying problems involved in fabrication and application are analyzed and lack of basic data for many common chemical and physical properties is emphasized. Part II: Design, fundamental problems, basic data required, equipment, and the present status. 107 ref. (L27, H general)

794-L. Long-Time Performance of Pipeline Coatings. Guy Corfield and C. W. Shupp. *American Gas Association, Proceedings*, v. 33, 1951, p. 439-447.

Nonmetallic coatings for underground pipe. Performance tests and specifications developed to maintain or improve the quality. Present quality control procedures and installation practices. Tabular data. (L26)

795-L. The Use of Barium Peroxide for Extending the Life of a Nickel Bath. Jason M. Zander. *Better Enameling*, v. 23, Aug. 1952, p. 6-7, 32.

A typical example of the over-all shop results obtained with respect to daily changes in pH and ferrous sulfate content affected by barium peroxide additions is shown in a table. Results cover a period of two months continuous operation, during which time approximately 450,000 sq. ft. of ware were processed in an 1800-gal. tank. (L27, Ni)

796-L. Anodic Oxidation and Colouring of Aluminium. Bernard C. Lewsey. *Electroplating and Metal Finishing*, v. 5, Aug. 1952, p. 250-253.

Aluminum anodized in chromic acid electrolyte by a modification of the Bengough process can be satisfactorily dyed to both pastel and deep colors and to black. In comparison with the finish produced by the normal H_2SO_4 process, the chromic acid finish appears much more solid and more closely resembles enamel or high-gloss paint. Experiences with this process on a production basis. (L19, Al)

797-L. Outplating at the Ionic Plating Company Ltd. *Electroplating and Metal Finishing*, v. 5, Aug. 1952, p. 254-258.

British job shop. Equipment used. (L17)

798-L. Tri and Perchlorethylene; Some Notes on Their Stability and Applications. *Electroplating and Metal Finishing*, v. 5, Aug. 1952, p. 259-260.

As metal-degreasing agents. (L12)

799-L. Metal Spraying on Hydro-Electric Plant; a Successful Application to the Pangani Falls Pipe Lines. J. F. Attwell. *Electroplating and Metal Finishing*, v. 5, *(Metal Spraying*, v. 2), Aug. 1952, p. 279, 281-282.

Equipment and procedures for sand-blasting and spray coating of interior of steel pipelines for water supply, located in Africa. (L10, L26, ST, Al)

800-L. Great Improvements in Finishing of Steel Furniture of Simmons Factory in Kenosha, Wisconsin. *Furniture Manufacturer,* v. 73, Aug. 1952, p. 12, 14-16, 59.

Equipment and procedures.
(L general, ST)

801-L. Screen Process Printing of Formed Metal Parts. Stephan Andrews. *Industrial Finishing,* v. 28, Aug. 1952, p. 64-66, 71-72, 74.

Procedures and equipment of Stewart-Warner Corp., for printing identifying markings on radar chassis. Presence of flanges on the sheet metal make the process unusually difficult. (L26)

802-L. Far Infrared Radiation Used as a Heat Source for Various Applications. *Industrial Heating,* v. 19, Aug. 1952, p. 1469-1470, 1472, 1474, 1476.

Many baking, degreasing, curing, preheating, and similar jobs have been speeded up by the comparatively new far-infrared radiant heaters. This rather different heat source radiates its energy in the almost invisible "far-infrared" portion of the spectrum. Advantages over conventional infrared. Typical installations. (L general, B18)

803-L. Selection of Metals Suitable for Heat Resistant Ceramic Coatings. *Industrial Heating,* v. 19, Aug. 1952, p. 1500.

Discussion on basis of guide prepared by Barrows Porcelain Enamel Co., Cincinnati, Ohio. (L27, SG-h, ST)

804-L. Tentative Recommended Practice for Painting and Repainting Elevated Steel Water Storage Tanks, Standpipes, and Reservoirs. *Journal, American Water Works Association,* v. 44, Aug. 1952, p. 749-764.
(L26, ST)

805-L. The Work of the Protective Coatings (Corrosion) Sub-Committee; British Iron and Steel Research Association. F. Fancutt and J. C. Hudson. *Journal of the Oil & Colour Chemists' Association,* v. 35, Aug. 1952, p. 396-416; disc. p. 416-417.

Investigations of protective coatings for structural iron and steel extending over 30 years. In the field of painting, research has shown the vital importance of correct surface preparation and the value of using inhibitive priming paints. Basic data were obtained for the performance of Al, Cd, Pb, Sn, and Zn coatings under various conditions of atmospheric exposure. Diagrams.
(L26, Fe, ST, Al, Cd, Zn, Pb, Sn)

806-L. Powdered Aluminum Paint Forms Aerodynamic Film on Aircraft Fuel Tank. *Light Metal Age,* v. 10, Aug. 1952, p. 19.

Application at Ryan Aeronautical Co. (L26, Al)

807-L. Electroplating Large Complex Shapes. F. K. Savage, A. K. Graham, and E. P. Strothman. *Materials & Methods,* v. 36, Aug. 1952, p. 94-97.

Successful use of electroplated coatings on large chemical equipment demonstrates that where applicable, they cost less than clad metals and solid metals and alloys. (L17, ST)

808-L. Can Linings. S. L. Flugge and J. C. Brichta, Jr. *Modern Packaging,* v. 25, Aug. 1952, p. 131-134, 188.

Recent developments in protective internal coatings for steel and tinplate. (L general, St, Sn)

809-L. Protective Coating Research by the Corps of Engineers. *Paint and Varnish Production,* v. 42, Aug. 1952, p. 17-22, 45-47.

Facilities and research programs of Engineer Research and Development Laboratories, Fort Belvoir, Va. (L26)

810-L. Battelle Memorial Institute. E. E. McSweeney. *Paint Industry Magazine,* v. 67. July 1952. p. 21.

Facilities for research and development in the field of protective organic coatings. (L26)

811-L. Chromizing. Shigetomo Ueda. *Reports of the Casting Research Laboratory,* no. 3, 1952, p. 59-60.

Experiments on pure iron and low-carbon steel treated by means of the chromous chloride process and of carbon steel treated by means of the chromium powder process.
(L15, CN, Fe)

812-L. Coated Abrasives Grind Down Costs. Robert E. Hall. *Steel,* v. 131, Aug. 25, 1952, p. 92-97.

A special report on equipment, procedures, and applications. Claims impressive cost reductions and rapid expansion in applications. (L10)

813-L. (German.) **Influence of Anode Apertures and Specially Shaped Anodes on Distribution With Depth in Galvanic Baths.** J. Steiner and K. Schery. *Metalloberfläche,* sec. B, v. 4, Aug. 1952, p. B113-B116.

Influence on metal distribution at hollow-cylinder cathodes. Diagrams and graphs. (L16)

814-L. (German.) **Anodic Oxidation of Small Aluminum Parts.** Heinz W. Dettner. *Metalloberfläche,* sec. B, v. 4, Aug. 1952, p. B116-B118.

Problems encountered in anodic oxidation of small parts in large quantities. Various solutions suggested in a number of German patents. Diagrams. (L19, Al)

815-L. (German.) **Observations on Iron Tips in the Field-Electron Microscope.** Hans-Walter Schleicher. *Zeitschrift für Naturforschung,* v. 7a, July 1952, p. 471-474.

An electrolytic polishing process for producing fine iron tips. Field-electron microscope pictures of such tips are shown to vary greatly. The great differences between iron tips and tungsten or molybdenum tips are ascribed to iron oxide films, the extreme tip being suspected to be an Fe_3O_4 crystal. Diagrams and photographs. (L13, M21, Fe)

816-L. Metal Spraying in the Reclamation of Worn Engine Parts. Donald E. Harris. *Australasian Engineer,* July 7, 1952, p. 58-61; disc., p. 61.

The molten metal and powder processes of metal spraying, plus explanation of the wire pistol used. (L23)

817-L. Electro-Spray Process Saves Time and Paint. Gene Anderson. *Automotive Industries,* v. 107, Sept. 1, 1952, p. 74, 98.

Process used for automobile frames. (L26, ST)

818-L. How Chrysler Cleans Car Bodies for Painting. J. D. Speirs. *Canadian Metals,* v. 15, Aug. 1952, p. 46, 48.

Phosphating process, used for cleaning metal preparatory to painting, a chemical treatment in which the surface of the metal is, by a chemical reaction, converted to a protective phosphate coating. (L14)

819-L. Porcelain Enamel Protects Pipe. *Chemical Engineering,* v. 59, Aug. 1952, p. 190.

Application of porcelain enamel coatings in fluxing and degassing Al alloys to inhibit corrosion of black steel pipes. (L27, ST)

820-L. Experiments With White Enamel Directly to Steel. A. L. Friedberg. *Finish,* v. 9, Sept. 1952, p. 23-26.

A progress report including treatment of steel, and study of effects of pre-enameling treatment on bond and appearance. Photographs and table summarize results. (L27, ST)

821-L. Oxy-Acetylene Build-Up Saves $1000. *Industry & Welding,* v. 25, Sept. 1952, p. 92-93.

See abstract of "Just a Repair? Or an Improvement?" *Welding Engineer,* item 838-L, 1952.
(L24, CI, Cu, SG-f)

822-L. The Electrodeposition of Silver on an Iron-Nickel Alloy for a Glass-to-Metal Seal Arrangement. R. T. Foley, R. D. Alvord, and J. K. Easley. *Journal of the Electrochemical Society,* v. 99, Sept. 1952, p. 349-353.

A method of Ag plating a 58% Fe, 42% Ni alloy to produce an electrodeposit capable of withstanding annealing at 850° C. Surface preparation of the alloy, proper salt concentration of the "strike' bath, and the plating step. Photomicrographs. (L17, Ag, Fe, Ni)

823-L. Electrolytic Determination of Tin and Tin-Iron Alloy Coating Weights on Tin Plate. C. T. Kunze and A. R. Willey. *Journal of the Electrochemical Society,* v. 99, Sept. 1952, p. 354-359.

Previously abstracted from *Steel,* item 133-L, 1952. (L17, Sn, Zn, Ni)

824-L. Cleaning Metals. Frank Spicer. *Machinery* (London), v. 81, Aug. 21, 1952, p. 328-331.

Various types of chemical methods. (L12)

825-L. Hard Chrome Plating of Aluminium. E. Mayer-Rässler. *Metal Industry,* v. 81, Aug. 15, 1952, p. 127-129.

Successful method used in applying the Cr plate. Photomicrographs. (L17, Cr, Al)

826-L. Getting the Most From HAE Coatings. M. Frager and H. A. Evangelides. *Metal Progress,* v. 62, Sept. 1952, p. 81-84.

The HAE electrolytic coating for Mg and Mg alloys is a nonmetallic coating which is very hard and adherent. Results of salt-spray tests. Suitable paint coatings for application on top of the HAE coatings. (L17, R11, Mg)

827-L. Electrotinning Copper Wire in Alkaline Bath. *Metal Progress,* v. 62, Sept. 1952, p. 126, 128. (Condensed from "Electrotinning Copper Wire: A New Process, Part I. The Process", Frederich A. Lowenheim, *Wire and Wire Products,* v. 27, May 1952, p. 464-467, 506-507.)
(L17, Cu, Sn)

828-L. British Views of Metal Finishing in America. *Metal Progress,* v. 62, Sept. 1952, p. 159-160. (Condensed from Productivity Report, "Metal Finishing", Anglo-American Council on Productivity).

Report by a group of Great Britain specialists who visited U. S. in 1950. Similarities between American and British plating practices. (L17)

829-L. Panel Discussions on Magnesium; Finishing and Joining. *Modern Metals,* v. 8, Aug. 1952, p. 49-52.

Second and last part of special report on series of panel discussions held last April by the Magnesium Association's Fabricating Division. Technical aspects of finishing and joining Mg.
(L general. K general, Mg)

830-L. Automotive Production Finishing. Rick Mansell. *Organic Finishing,* v. 13, July 1952, p. 10-12, 16; Aug. 1952, p. 9-13.

Preparation of the surfaces of automobile parts for finishing. Part II: The actual finishing operations. (L26)

831-L. Painting by Flotation Method. L. B. Donovan. *Organic Finishing,* v. 13, Aug. 1952, p. 20-21, 23.

Previously abstracted from *American Paint Journal,* item 79-L, 1952. (L26, ST)

832-L. Rinsing. H. L. Pinkerton. *Plating,* v. 39, Sept. 1952, p. 1016-1017, 1031.

Revision of some equations of Kushner which the author believes to give impossible results. Improved equations for use in analysis of the process of rinsing articles after removal from the electroplating tank. (L17)

833-L. Hard Chromium Plate to Improve the Corrosion Resistance of Tool Steel. H. E. Ricks. *Plating,* v. 39, Sept. 1952, p. 1029-1030.

Corrosion protection offered by hard Cr plating was found to be proportional to the thickness of the Cr plate and to the surface smoothness of the panel before plating. (L17, R general, Cr)

834-L. Effect of Impurities and Purification of Electroplating Solutions. I. Nickel Solutions. 5. The Effects and Removal of Zinc. D. T. Ewing, A. A. Brouwer, D. D. Clark, C. J. Owen, R. J. Rominski, and J. K. Werner. *Plating,* v. 39, Sept. 1952, p. 1033-1037.

Effect of trace amounts of Zn in nickel solutions on the properties of Ni electrodeposits. Graphs show effects of Zn concentration on luster of deposits, on throwing power of solutions, on corrosion resistance, and on hardness of the deposits. (L17, Q29, R general, Ni)

835-L. Slip Covers for Fuel Tanks. *Steel,* v. 131, Sept. 1, 1952, p. 87-88.

Air resistance of aircraft external fuel tanks is greatly reduced by a coating of zinc chromate solution and a synthetic rubber-base compound. (L26)

836-L. Welding Doubles Life of Forging Dies. Arthur L. Phillips. *Steel,* v. 131, Sept. 8, 1952, p. 86-87.

Newly developed welding technique prolongs life of drop-forging dies used in the manufacture of toolsteel claw hammers. Reversal of procedure of extending die life from shaving to building up by welding is applied. (L24, TS)

837-L. Keeping Big Equipment in Service. III. T. B. Jefferson. *Welding Engineer,* v. 37, Sept. 1952, p. 27-29.

Reclamation of large wearing surfaces on tractor and other parts to which the methods of automatic hard facing may be applied by manual arc welding. (L24)

838-L. Just a Repair? Or an Improvement? *Welding Engineer,* v. 37, Sept. 1952, p. 39, 48.

Method in which nickel silver brazing alloy is used to repair cast-iron flax drying heads of Cargill, Inc., Savage, Minn. (L24, CI, Cu, SG-f)

839-L. Proper Heat Applied to Galvanizing Pot. Max Mysell. *Western Metals,* v. 10, Aug. 1952, p. 46-48.

Proper heating gives good coating, long pot life, and fast production. (L16, CN, Zn)

840-L. Clad-Steel Sheets and Their Application in Chemical Engineering. Heinrich Canzler. 4th International Mechanical Engineering Congress, June 1952, 12 pages.

Manufacturing process, base metal and cladding materials, mechanical and thermal properties, welding, and design and economic considerations. Photographs and construction diagrams for various apparatus. (L22, Q general, P11, ST, Cu, Ni, Ag)

841-L. Continuous Surface Treatment of Aluminium Strip for the Canning Industry. Dag Nickelsen. 4th International Mechanical Engineering Congress, June 1952, 9 pages.

Anodizing and lacquering processes at the Nordisk Co., Oslo, Norway. A company-developed Al-Mg alloy is used. (L19, L26, Al)

842-L. Surface Treatment for Saving and Substitution of Materials. H. Wiegand. 4th International Mechanical Engineering Congress, June 1952, 4 pages.

Classifies surface treatments and gives numerous brief examples or suggestions for their use. Includes mechanical, chemical, electrochemical, and diffusion processes, and coating with metallic and nonmetallic layers. Metals mentioned include carbon, alloy, and stainless steels, Al alloys, stellites, Zn, and Cr. Tabular data on influence of thread production and surface quality of thread on tensile fatigue strength of screws; and fatigue strength of piston pins, case hardened on all sides —for low alloy and C steels. (L general, Q7)

843-L. Ways and Means for the Economical Use of Zinc During Hot Dip Galvanizing. Hans Rueckemesser. *Draht* (Wire) (English Ed.), July 1952, p. 38-40.

Brief evaluation of pros and cons of various processes. (L16, Zn, CN)

844-L. The Application of Bonderizing to Steel and Iron Wire Drawing. *Draht* (Wire) (English Ed.), July 1952, p. 40-42.

General discussion. Saving of dies, increase of drawing speed, and other advantages where this method is employed. (L14, F28, ST, Fe)

845-L. The Control of Pickling Baths by Measuring the Electric Conductivity of the Pickling Liquid. Rudolf Bruehl. *Draht* (Wire) (English Ed.), July 1952, p. 52-53.

Experimental data on measurement of free acid on the basis of conductivity of the pickling liquid. (L12)

846-L. (French and German.) **The "Al-Fin" Process.** E. Herrmann. *Aluminium Suisse,* v. 2, July 1952, p. 115-125.

Process for joining of Al and its alloys to ferrous metals, and its application on the basis of the patent literature. Diagrams, photographs, and micrographs illustrate details of the process. (L22, Al, Fe)

847-L. (French.) **Cathodic Deposits in Monoatomic Layers of Bismuth on Platinum and Gold.** A. Coche, J. Danon, and M. El. Guébély. *Journal de Chimie Physique et de Physico-Chimie Biologique.,* v. 49, June 1952, p. 363-366.

Results of investigation are charted, tabulated, and discussed. (L25, Bi, Pt, Au)

848-L. (German.) **Cutting Edges Welded Onto Shearing Knives for Ingots and Billets.** H. Wolff and W. Hummitzsch. *Schweissen und Schneiden,* v. 4, Aug. 1952, p. 288-289.

By welding high speed steel edges on shearing knives of unalloyed steels, the life of such knives can be increased considerably. Technical and economic considerations. (L24, CN, TS)

849-L. Precision Investment Castings; Cleaning in Molten Caustic Soda. N. L. Evans. *Iron & Steel,* v. 25, Sept. 1952, p. 396-397.

Cleaning process which can be used for most metals (Fe, Ni, Cu, and alloys), notable exceptions being Sn, Pb, Zn, and Al. By using this method investment material is completely freed from the metal. (L12, E15, Fe, Ni, Cu)

850-L. Review of Surface Finish Literature. John W. Sawyer. *Machine Design,* v. 24, Sept. 1952, p. 147, 290, 292, 294, 296, 298, 301-302, 305-306.

Bibliography of literature published during years 1948-1951. (To be continued.) (L general)

851-L. Electroplating Steel Springs. *Metal Industry,* v. 81, Aug. 29, 1952, p. 167-168.

Recommendations issued by the Coil Spring Federation Research Organization. Principles for cleaning and electroplating hardened and tempered steel springs, or springs made from cold worked steels. (L17, T7, ST)

852-L. Chromate Protective Coatings. C. W. Ostrander. *Product Engineering,* v. 23, Sept. 1952, p. 127-134.

Application to nonferrous metals (Zn, Al, Cu, and Cu alloys). Method of application. Advantages are high resistance to corrosion, provision of firm bond for paint, and improved appearance of Zn and Cu plate. (L14, Zn, Al, Cu, Cr)

853-L. Teflon Components and Coatings. *Product Engineering,* v. 23, Sept. 1952, p. 149-153.

Properties and uses as a gasket material and as a protective coating on steel, cast iron, brass, and Cr. (L26, ST, Cu, Cr)

854-L. Hot Enamel Provides Finish on American Kitchens. Walter Rudolph. *Products Finishing,* v. 16, Sept. 1952, p. 22-26, 28.

Preparation and enameling of kitchen cabinets made of 10-gage, automobile grade sheet steel and coated with white DuPont Dulux enamel applied at 160° F. (L27, ST)

855-L. Surface Tension Control in the Plating Room. Joseph B. Kushner. *Products Finishing,* v. 16, Sept. 1952, p. 32-36.

Advantages; theory; surfactant (wetting agent) selection. A simple surface tension measuring device, the Sur-Ten-Meter. Photographs and diagrams. (L17, P10)

856-L. Chromic Acid Anodizing to Meet Military Specifications. *Products Finishing,* v. 16, Sept. 1952, p. 46, 48, 50, 52.

Practical aspects of chromic acid anodizing based on a recent paper by Herberth E. Head on experiences at Briggs Manufacturing Co., Detroit. (L19, ST)

857-L. Plating Cobalt-Tungsten-Molybdenum Alloys. *Products Finishing,* v. 16, Sept. 1952, p. 52, 54, 58, 60.

See abstract of "The Electrodeposition of Cobalt-Tungsten-Molybdenum Alloys From Aqueous Citrate Solutions", R. F. McElwee and M. L. Holt, *Journal of the Electrochemical Society;* item 172-L, 1952. (L17, Co, W, Mo)

858-L. Take Advantage of Modern Finish Application Methods. *Products Finishing,* v. 16, Sept. 1952, p. 60, 62, 66, 68.

Automatic spray finishing; hot spraying process (including hot spraying in relation to Quartermaster Corps requirements); conveyorized dipping; and electrostatic methods. (L26)

859-L. Nickel Dip in Porcelain Enameling. *Products Finishing,* v. 16, Sept. 1952, p. 70, 72.

Discussion based on several recent reports in the literature. (L27, Ni)

860-L. Hot Spray Lacquer Schedule for Finishing Armored Tank. *Products Finishing,* v. 16, Sept. 1952, p. 72, 74, 76.

Step-by-step schedule for hot spray lacquer application as used in a recent demonstration of the painting of an M46 Tank hull. Schedule conforms to the new military specification, MIL-L-11195. (L26, ST)

861-L. Tin Alloy Plating. *Products Finishing,* v. 16, Sept. 1952, p. 76, 78, 80. (Based on talks by F. A. Lowenheim, and by J. W. Cuthbertson and N. Parkinson).

Properties of Sn-Zn alloy deposits, bath formulations and conditions for shop use. Effect of variables on the composition and properties of Sn-Ni alloys plated from a bath containing stannous chloride, nickel chloride, sodium fluoride, and ammonium bifluoride. Corrosion resistance and formula.
(L17, R general, Sn, Zn, Ni)

862-L. Lacquer Viscosity Affects Application Properties and Quality of Finish. *Products Finishing,* v. 16, Sept. 1952, p. 80, 82, 84, 86.

Based in part on data from Shell Chemical Corp. and Hercules Powder Co. (L26)

863-L. Precision Production Plating. Perry J. Sloane. *Screw Machine Engineering,* v. 13, Sept. 1952, p. 37-38.

The precision plating of small metal parts with precious metals. Ag or Au is deposited on various ferrous and nonferrous base metals. (L17, Ag, Au)

864-L. A Casting Process for Bonding Aluminium to Ferrous Metals (Al-Fin Process). G. Gürtler. 4th International Mechanical Congress, June 1952, 9 pages.

The process and the properties of the bond; applications. Photomicrographs of structure. (L22, Al, Fe, St)

865-L. Electro-Polishing and Material. Joseph Heyes. 4th International Mechanical Engineering Congress, June 1952, 8 pages.

A survey aimed at drawing attention to the advantages of electropolishing. Test results in relation to fatigue, crystal structure, corrosion, light reflection, and friction and wear. Materials are steel and Al. Table, photomicrographs, and graphs. 11 ref.
(L13, M26, R general, Q7, Q9, P17, ST, Al)

866-L. (Book) **Finishing Handbook and Directory.** W. J. Roberts and A. G. Bennet, editors. 600 pages. 1952. Sawell Publications, Ltd., 4 Ludgate Circus, London E.C. 4, England. 15s.

Pretreatment processes, followed by paint finishes and the associated processes of lacquering, wood finishes, transfers, lining, and flock spraying. Further sections deal with electroplating, galvanizing and metal coloring. New sections cover marking processes, car finishes, and trick finishes. Tables, a comprehensive subject index and a directory of trade names, supplies, services and equipment. (L general)

867-L. Photographic Reproduction on Aluminum by the "Fotoanodizado" and "Ricolor" Processes. J. M. Alemeda. *Electroplating and Metal Finishing,* v. 5, Sept. 1952, p. 286-288.

Two processes developed in laboratories of Marconi Espanola, S.A., Madrid, for reproducing photographs, etc. on anodized Al. The Fotoanodizado process is limited to blue, but some color variation is possible with the other process. Claimed to be cheaper, simpler, and more rapid than other processes. (L14, Al)

868-L. Finishing Zinc Base Die Castings. *Electroplating and Metal Finishing,* v. 5, Sept. 1952, p. 289, 291.

Based on a publication of Imperial Smelting Corp., Ltd. (L general, Zn)

869-L. Alternatives to Nickel-Chromium Plating. *Electroplating and Metal Finishing,* v. 5, Sept. 1952, p. 292-298.

Summary of papers presented at a recent conference sponsored by the Melbourne, Australia, branch of the American Electroplaters' Society. Topics include bright Zn plating; colorless lacquers; Cr plating with and without Ni undercoating; and periodic reverse current Cu plating. Brief notes are given on bright acid Cu; bright white brass; Sn-Zn; bronze; and Sn-Ni.
(L17, Ni, Cr, Zn, Cu, Sn)

870-L. Metal Spraying in Russia. *Electroplating and Metal Finishing,* v. 5; *Metal Spraying,* v. 2, Sept. 1952, p. 315, 317-318. (Based on articles in *Stanki i Instrument,* 1951: No. 6, p. 38 and No. 11, p. 34)

New Russian spraying pistols: electric arc type EM-4; and low pressure acetylene type GIM-1. (L23)

871-L. Forging Dies Finished, Maintained by Wet Blasting. E. F. Anderson. *Iron Age,* v. 170, Sept. 18, 1952, p. 160-162.

Directional lines and grinding wheel snags are efficiently removed. Tolerances, sharp corners, and lines are not affected. The abrasive gets

into areas inaccessible by hand, produces an easy-releasing matte finish. (L10, F22)

872-L. Felt for Metal Finishing and Polishing. Leon D. Gruberg. *Metal Finishing,* v. 50, Sept. 1952, p. 58-63.

See abstract, *Steel,* item 190-L, 1952. (L10, Al, Cu, SS)

873-L. Material Control in Nickel Chrome Plating. Robert T. Hood. *Metal Finishing,* v. 50, Sept. 1952, p. 64-66. (Reprinted from *Cost and Management,* Mar. 1952.)

Certain technical data in the process of nickel chrome plating make it possible to accurately apportion plating material as productive material rather than through arbitrary distribution of overhead. (L17, Ni, Cr)

874-L. White Brass Plating at Hamilton Mfg. Corp. C. C. Weekly. *Metal Finishing,* v. 50, Sept. 1952, p. 67-69.

Some experiences and findings at the above plant, Columbus, Indiana. Semi-automatic plating machines are used. Photographs. (L17, Cu)

875-L. Russians Claim Discovery of New Electroplating Method Using Alternating Current. *Metal Finishing,* v. 50, Sept. 1952, p. 69, 80.

A note based on an article in "Pravda." (L17)

876-L. The Metal Decorating Oven. C. H. Whitaker. *National Lithographer,* v. 59. Sept. 1952, p. 26-27, 86-89.

Factors involved in the development of the modern sheet oven. (L26)

877-L. Tin Plate. W. D. Poole. *National Lithographer,* v. 59, Sept. 1952, p. 28-31, 81-86.

The development of tin plate surfaces in use in metal decorating plants today. (L17)

878-L. Coatings. Henry Bates. *National Lithographer,* v. 59, Sept. 1952, p. 32-35, 89-90.

Sizing, coatings, inks, varnishes, and gold lacquer. (L26)

879-L. Rollers for Metal Decorating. Kenneth Butler. *National Lithographer,* v. 59, Sept. 1952, p. 36-37, 90-91

How various developments in manufacture of rollers have affected the metal decorating industry. (L26)

880-L. Solventless Wax-Resin Impregnants. Sam Ruggeri. *Paint and Varnish Production,* v. 42, Sept. 1952, p. 25-28.

Use in protecting electrical and electronic equipment from moisture and fungus growth. (L26)

881-L. Porcelain Enamels Vs. Organic Finishes. Philip Heiberger. *Paint and Varnish Production,* v. 42, Sept. 1952, p. 35-36, 81.

What porcelain is, how it is made, its advantages, restrictions, applications, and potentialities. (L27)

882-L. Phosphate Coating Progress 1945-52. A. R. King. *Paint Manufacture,* v. 22, Sept. 1952, p. 325-329.

Includes improved test methods and preparation of specifications, rapid iron phosphate treatments, derusting by phosphoric acid metal conditioners incorporating organic grease solvents and surface activators, and cold phosphating, especially for rusty surfaces. (To be concluded.) (L14)

883-L. Marine Paints: A Review of Recent Trends in Ship Coatings. *Paint Manufacture,* v. 22, Sept. 1952, p. 330-335.

Surveys various factors of fouling and corrosion together with development of marine coatings with specific qualities required for varying conditions found on ships. Surface preparation before paint application. Results of a series of efficiency tests. Future trends in marine paint field. (L26, R4, ST)

884-L. Ceramics Shrug Off Turbine's Tempest. *SAE Journal,* v. 60, Sept. 1952, p. 38-41. (Based on "Applications of Ceramic Coatings in Aircraft Engines", by John V. Long.)

Use of ceramic coatings to withstand heat and corrosion and to conserve critical materials. Test results on comparative oxidation rates of uncoated Inconel, uncoated AISI 321 stainless; and solaramic-coated 321; and on effect of corrosive agents on uncoated and solaramic-coated 321 stainless. (L27. R general, SS, Ni)

885-L. A Contribution to the Theory of Enamel Adherence. Morris Berg and Michael Humenik, Jr. *American Ceramic Society Bulletin,* v. 31, Sept. 1952, p. 329-331.

A study of the influence of reduced Co on glass-iron adherence by a quantitative determination of the force of adhesion at elevated temperatures. Role of a surface oxide layer on the Fe. Diagrams and micrographs. (L27, Fe)

886-L. How Friden Applies Solid-Film Lubricants. Fred Shear. *American Machinist,* v. 96, Sept. 29, 1952, p. 128-129.

Mechanized setup for finishing steel parts by applying a solid-film lubricant now in use by Friden Calculating Machine Co., Inc. This lubricant is rust resistant, has excellent antifriction properties, and retains its lubrication characteristics regardless of temperature. (L14, ST)

887-L. Flame-Plating Coats Metals With Carbide. *American Machinist,* v. 96, Sept. 29, 1952, p. 152-153.

New Linde process in which tungsten carbide is neither diluted nor alloyed with base metal. It can be applied to any metal in thicknesses from 0.0005 to 0.020 in. Bond is mechanical and similar to that created by metal spraying. (L22, C-n)

888-L. Ceramic Coatings for Civilian and Defense Products. *Finish*, v. 9, Oct. 1952, p. 38-39, 74.

New coatings used for domestic heating equipment and those applied to jet-engine components. (L27, SG-h)

889-L. Porcelain Enamel Institute Annual Shop Practice Forum. *Finish*, v. 9, Oct. 1952, p. 48-50, 52-54, 55.

Some reports from the above forum adapted for publication as follows: "Solving Seam Welding Problems", J. J. Baker; "Luminescent Porcelain Enamels," D. C. Bowman; "Spraying and Spray Equipment", Roy D. Beck; "New Pickling Compounds," James B. Willis; and "Stable Colors in Titania-Opacified Enamels", H. L. Launders. (L27)

890-L. Cleaning, Dow Treating and Finishing Magnesium Products. James D. Breneman. *Industrial Finishing*, v. 23, Sept. 1952, p. 20-22, 24, 26, 28, 30, 32, 34.

Chemical processes by which Northrop Aircraft cleans and coats Mg alloy parts to prevent corrosion. (L general, Mg)

891-L. Surface Treating Instrument Parts Under Automatic Control. William R. Sweet and Harold Twigg. *Industrial Finishing*, v. 28, Sept. 1952, p. 38-40, 42, 44.

Processes of cleaning and spray-finishing iron, steel, and Al parts to withstand extreme atmospheric conditions, dust, and corrosion. (L12, L26, R3, Fe, ST, Al)

892-L. "Take Painting to the Part", Lincoln Electric's System. Walter Rudolph. *Industrial Finishing*, v. 28, Sept. 1952, p. 58-60, 62, 66, 68.

Process by which parts are cleaned and painted at various mobile paint units on assembly line. Advantages. (L26, ST)

893-L. How Gas Plays an Important Part in Ups and Downs of Modern Living. Roy H. Minton. *Industrial Gas*, v. 31, Sept. 1952, p. 3-5.

Pictorial story of facilities installed at Otis Elevator Co. for finishing fabricated panels. (L general)

894-L. Plating: Making Metals Tougher. *Iron Age*, v. 170, Oct. 1952, p. 43.

See abstract of "Flame-Plating Coats Metals With Carbide", *American Machinist;* item 887-L, above. (L22, C-n)

895-L. Engineering Applications for Chromium Plating. Richard Wick. *Iron and Steel Engineer*, v. 29, Sept. 1952, p. 109-111.

Mechanical properties, specifications, production of Cr-plated machine elements, and use in maintenance. (L17, Q general, Cr)

896-L. Metallizing and Its Functions. B. Simon. *Iron and Steel Engineer*, v. 29, Sept. 1952, p. 112-113.

Fields in which metallizing is useful are corrosion, rebuilding worn parts and mis-machining. Preparation of surfaces is accomplished by sand blasting, grit blasting, and rough threading. Any metal except Cr may be used. (L23, L10)

897-L. New Process Permits Many Metals to be Tungsten Carbide Coated. *Journal of Metals*, v. 4, Oct. 1952, p. 1036-1037.

See abstract "Flame-Plating Coats Metals With Carbide," *American Machinist;* item 887-L, above. (L22, C-n)

898-L. Chemical and Anodic Treatments. (Concluded.) V. F. Henley. *Light Metals*, v. 15, June 1952, p. 184; July 1952, p. 220-221; Aug. 1952, p. 266-267; Sept. 1952, p. 284-285.

An annotated list of recent patents on electrobrightening and electropolishing; chemical brightening; anodizing; and after-treatment of oxide films. Considers anodizing patents published by the British Patents Office since 1946, and appraises their potential or known usefulness. (L19)

899-L. Epoxide Resin Coatings Have Excellent Chemical Resistance, Adhesion, Abrasion Resistance. T. R. Hopper. *Materials & Methods*, v. 36, Sept. 1952, p. 90-93.

Properties of these coatings, and fields of applications including equipment, containers, and pipes. (L26)

900-L. Continuous Anodizing and Lacquering of Aluminium Strip. *Metal Industry*, v. 81, Sept. 12, 1952, p. 208-211.

The process with a description of Norwegian plant. Uses and properties of strip. Photographs and diagrams. (L19, L26, Al)

901-L. High Vacuum Metallizing. A. H. Hartman. *Modern Plastics*, v. 30, Oct. 1952, p. 115-116, 118.

As applied to plastics. Production of a suitable undercoat upon which metal is deposited by dipping in lacquer and baking; production of film by metal evaporation in a high vacuum; and providing a protective coating of baked lacquer over the metal film. Photographs. (L25)

902-L. The Significance of Tests on Collapsible Tube Finishes. D. F. Men-

ard. *Paint, Oil, and Chemical Review,* v. 115, Sept. 25, 1952, p. 20-21.
(L general)

903-L. Hot-Spray Finish Applied Under Varied Conditions. *Railway Age,* v. 133, Oct. 6, 1952, p. 106-107.
Hot-spray finish now being applied experimentally to freight cars. (L26)

904-L. New Finishes Give Refrigerator Parts Improved Runoff Properties. O. J. Spawn. *Refrigerating Engineering,* v. 60, Sept. 1952, p. 944-945.
Brief account of theory, and organic and silicone finishes. Influence of metal substrate. (L27)

905-L. Flame Plating: Wearing Parts Get Longer Lease on Life. *Steel,* v. 131, Sept. 29, 1952, p. 82-84, 86.
See abstract of "Flame Plating Coats Metals With Carbide", *American Machinist;* item 887-L, above. (L22, C-n)

906-L. Prevention of Marine Corrosion by Metallizing Systems. Howard Vanderpool. *Welding Journal,* v. 31, Sept. 1952, p. 791-798.
A method has been developed for spraying Zn or Al to protect marine equipment over a period of life of ships. This is used in conjunction with organic coatings. Case histories. (L23, ST, Zn, Al)

907-L. The Increasing-Load Wire Abrasion Tester. H. T. McLean. *Wire and Wire Products,* v. 27, Sept. 1952, p. 871-873, 928-929.
A method of testing abrasion resistance of magnet wire coatings that has increased accuracy and speed of testing and that provides manufacturer an important control on application of enamels to wire. Photographs, diagrams. (L26, Q9)

908-L. A Portuguese Wire Galvanising Plant. *Wire Industry,* v. 19, Sept. 1952, p. 828, 831-832.
New installation by Incandescent Heat Co. Ltd., Birmingham. (L16, CN, Zn)

909-L. Solar Expects Big Future for Coatings. *Ceramic Industry,* v. 59, Oct. 1952, p. 96-97, 99-100.
Method and use of ceramic coatings on high and low alloys in a range of temperatures up to 2000° F. for jet and reciprocating engines. (L27, SS, SG-h)

910-L. Brassfoundry Finishing Methods. F. Wild. *Foundry Trade Journal,* v. 93, Oct. 2, 1952, p. 393-396, 400.
Methods and machinery for performing intermediate and final operations on general brass-foundry components including electrolytic and chemical polishing, bright dipping, degreasing and chemical cleaning, plating, coating, and lacquering. (L general, Cu)

911-L. Tin and Its Alloys. Robert J. Nekervis. *Industrial and Engineering Chemistry,* v. 44, Oct. 1952, p. 2360-2364.
Annual construction-materials review. Tin alloy electroplating, electrotinning and immersion tinning practice, corrosion resistance of tinplate containers, corrosion resistance of other tin coatings, hot-dip coating, soft solders, and tin-containing materials. 102 ref. (L16, L17, Sn)

912-L. Adhesion of Lacquers to Nonferrous Metals. L. Reed Brantley, Arthur Woodward, and Gordon Carpenter. *Industrial and Engineering Chemistry,* v. 44, Oct. 1952, p. 2386-2389.
The Adherometer which is used to study the nature of adhesion of organic coatings to nonferrous metals. Factors responsible for adhesion of nitrocellulose and ethylcellulose lacquers to Al were investigated. Optimum dibutyl phthalate plasticizer content for adhesion is reported. Tables, diagrams, and graphs. 21 ref. (L26, Al, EG-a)

913-L. Anticorrosive Primers; Pigments and Vehicles Applicable to Magnesium. Allen L. Alexander, Harold J. E. Segrave, Rodger Freriks, and J. E. Cowling. *Industrial and Engineering Chemistry,* v. 44, Oct. 1952, p. 2409-2414.
Investigation to develop more effective inhibitive organic coatings for Mg. Tables. 11 ref. (L26, Mg)

914-L. The Nature of the Film Present on Iron After Brightening in Marshall's Solution. A. Hickling, W. A. Marshall, and E. R. Buckle. *Journal of the Electrodepositors' Technical Society,* v. 28, 1952, p. 47-60; disc., p. 61-68. (Preprint.)
Evidence indicates that the film consists of a very thin but tenacious and continuous layer of oxide. By reducing film cathodically in an NH_4Cl electrolyte and observing quantity of electricity involved, thickness of film was estimated and found to be of the order of 60 Å. (L25, S14, Fe)

915-L. Finishes for Communications Equipment With Special Reference to Electroplate Coatings. E. C. J. Marsh. *Journal of the Electrodepositors' Technical Society,* v. 28, 1952, p. 69-88. (Preprint.)
A general treatment, avoiding technical details. (L17)

916-L. Thin, Ductile Carbide Coatings Possible With New Method. F. E. King. *Materials & Methods,* v. 36, Oct. 1952, p. 112-114.
See abstract of "Flame-Plating Coats Metals With Carbide". *American Machinist;* item 887-L, 1952. (L22, C-n)

917-L. Chromium-and-Glass High-Temperature Coatings for Molybdenum. *Metal Finishing,* v. 50, Oct. 1952, p. 61.

See abstract of "Study of Chromium-Frit-Type Coatings for High Temperature Protection of Molybdenum." D. G. Moore, L. H. Bolz, J. W. Pitts, and W. N. Harrison. National Advisory Committee for Aeronautics, Technical Note 2422; item 608-L, 1951. (L27, Mo)

918-L. Finishing Magnesium. John Starr. *Metal Finishing,* v. 50, Oct. 1952, p. 62-64.

Preparation of Mg for finishing, use of chemical treatments, and organic coatings. (L14, L26, Mg)

919-L. Anodizing Aluminum With Sulfamic Acid: Comparison of Sulfuric, Oxalic and Sulfamic Acid Processes. Sakae Tajima, Yasuyuki Kimura, and Toshiro Fukushima. *Metal Finishing,* v. 50, Oct. 1952, p. 67-71.

Experimental procedure and results. Data on resistance to abrasion and corrosion. Diagrams and graphs. (L19, R general, Q9, Al)

920-L. Alkali Cleaner "Life". H. K. Hunt. *Metal Finishing,* v. 50, Oct. 1952, p. 72-73.

Chemical and physical factors; saponification, conversion to carbonates, dirt load, drag-out, volume of solution, and adsorption which can alter the life of a metal cleaner. (L12)

921-L. Acid Pickling Solutions. E. E. Halls. *Metal Finishing,* v. 50, Oct. 1952, p. 74-78, 81.

Previously abstracted from "A Study of Acid Pickling Solutions For Wrought Iron and Steel With Special Reference to Use of Inhibitors", *Electroplating and Metal Finishing;* item 527-L, 1952. (L12, Fe, ST)

922-L. Air Agitation: Its Effects in Sulphuric Acid Anodizing. R. C. Spooner. *Metal Industry,* v. 81, Sept. 26, 1952, p. 248-250.

Experiments which show how air agitation influences current density and film thickness in anodizing Al. Diagrams and tables. (L19, Al)

923-L. Abrasive Tumbling Gives Precision Finishes Economically. Allen G. Gray. *Metal Progress,* v. 62, Oct. 1, 1952, p. 104-108.

Procedures and equipment. Typical applications to small parts. (L10)

924-L. Increasing Copper Content in White Brass and Copper Cyanide Solutions by Electrolytic Regeneration. Walter R. Binai. *Plating,* v. 39, Oct. 1952, p. 1120-1121, 1131.

New method of introducing Cu to the plating solution without addition of copper cyanide or copper cyanide concentrate which is accomplished by an electrolytic regeneration cell. Diagrams. (L17, Cu)

925-L. Copper Striking on Zinc Base Die-Castings. Irwin K. Hauseman. *Plating,* v. 39, Oct. 1952, p. 1125-1126, 1131.

How problems encountered in plating Zn die castings by one job shop were solved. Intensive studies relating to Cu striking problems over a 6-year period. Different types of faulty plating and their remedies. (L17, Cu, Zn)

926-L. Colourless Lacquers. J. Towner. *Plating Notes,* v. 4, June 1952, p. 87-90; disc., p. 91-96.

Available types and their application for protection of Cr and bright Zn finishes. (L26, Cr, Zn)

927-L. Bright Zinc Plating. R. D. Taylor. *Plating Notes,* v. 4, June 1952, p. 74-83; disc., p. 91-96.

Corrosion resistance and appearance ratings of types of Zn finish; cyanide bath formula and bath control; bright dipping solutions with a detailed coverage of chromate finishing; corrosion resistance of bright Zn; and application. (L16, L17, R general, Zn, Cr)

928-L. Practical Experiences With Bright Zinc Plating. A. Chesterfield. *Plating Notes,* v. 4, June 1952, p. 84-86; disc., p. 91-96.

For practical man engaged in plating bright zinc. Equipment, costs, and composition and control of plating and bright dipping solutions. (L16, L17, Zn, Cr)

929-L. Chromium Plating With or Without Undercoats. Introduction. J. J. Dale. *Plating Notes,* v. 4, June 1952, p. 97-99.

As a basis for subsequent conference papers, reviews briefly what is known of the performance of chromium when used in decorative and protective coatings. Data for ferroxyl-type porosity tests. (L17, Cr, Ni, Zn)

930-L. Practical Experiences With Chromium Without Nickel Undercoats. D. Cam. *Plating Notes,* v. 4, June 1952, p. 100-101; disc., p. 105-106.

Use of a special proprietary "cold" Cr solution. Properties of coatings, and corrosion tests for Cr over brass and Cr-Zn over steel. (L17, R11, Cr, Zn, Cu, ST)

931-L. A Report on Periodic Reverse Current Copper Plating. H. J. Merton. *Plating Notes,* v. 4, June 1952, p. 102-104; disc., p. 105-106.

P. R. cycle, current density, agitation and filtration, solution composition, applications, and corrosion resistance of Cu, Cr-Cu, and Ni-Cu on Zn alloys. (L17, R general, Cu, Cr, Ni, Zn)

932-L. Third Technical Session (Conference on Nickel Alternatives.) *Plating Notes,* v. 4, June 1952, p. 107-113.

Information, including formulas, on bright Zn, bright acid Cu, and white brass plating; on bronze as an undercoat for Cr; on Sn coatings. Includes discussion. (L17, Zn, Cu, Sn, Cr)

933-L. The Contamination in Evaporated Films by the Material of the Source. O. S. Heavens. *Proceedings of the Physical Society,* v. 65, sec. B, Oct. 1, 1952, p. 788-793.

Methods to detect contamination of films of Ag or Ge by boats or filaments of W, Mo, or Ta used as sources. For tests at pressures down to 5 x 10^{-6} mm. Hg, a metal system employing an oil diffusion pump was used; for pressures down to 10^{-7} mm. Hg, a glass system with a mercury pump and solid CO_2 + acetone was used. Tables. (L25, Ag, Ge)

934-L. More About Ceramic Coatings. *Product Engineering,* v. 23, Oct. 1952, p. 134-141.

National Bureau of Standards and proprietary coatings. Newer types of ceramic coatings for high-temperature alloys, ceramals, Mo, and resistance-wire strain gages. Photographs and tables. (L27, SG-h, Mo)

935-L. Surface Treatment and Finishing of Light Metals: Part 7. S. Wernick and R. Pinner. *Sheet Metal Industries,* v. 29, Sept. 1952, p. 843-854.

Series is continued from Oct. 1951 issue. Coloring, photographic processes, and sealing. Tables and graphs. (To be continued.) (L14, EG-a)

936-L. The Surface Treatment of Ferrous Metals Prior to Painting. H. J. Testro. *Sheet Metal Industries,* v. 29, Oct. 1952, p. 931-940.

Abrasive methods (manual and mechanical), tumbling, dry blasting, vapor blasting, solvent cleaning, acid pickling, alkaline pickling, emulsion cleaning, electrolytic cleaning, phosphating, galvanizing, Sherardizing, tin and terneplate, and metal spraying. (L general, Fe, ST)

937-L. The Mechanical Surface Finishing of Metals. (Continued.) G. T. Colegate. *Sheet Metal Industries,* v. 29, Oct. 1952, p. 941-948.

Polishing the specific metals, steel, cast iron, stainless steel, Mg alloys, Monel, Al, nickel silver, solid Ni, Cu, brass stampings, solid Ag, Au, Pt, Pd, Zn-base die castings, and Britannia metal and pewter. Polishing electrodeposits is included. (To be continued.) (L10)

938-L. Flame Plating Applies Metal Coatings. *Tool Engineer,* v. 29, Oct. 1952, p. 96-99.

See abstract, "Flame-Plating Coats Metals With Carbide", *American Machinist:* item 887-L, 1952. (L22, C-n)

939-L. Cleaning Stainless Before and After Welding. *Welding Engineer,* v. 37, Oct. 1952, p. 60-61.

Emphasis on good housekeeping procedures to eliminate preweld cleaning. Methods of cleaning are by wire brush, chemicals, and sand blasting. Need of cleaning for brazing and post-welds. (L10, L12, K general, SS)

940-L. (Book.) **Encyclopedia of Surface-Active Agents. Rev. Ed.** J. P. Sisley and P. J. Wood. 540 pages. 1952. Chemical Publishing Co., 212 Fifth Ave., New York 10, N. Y. $15.00.

Part 1: General aspects of surface-active agents, their properties, applications, and methods of manufacture. System of classification. Applications in various industries including treatment of metals, surface coatings, flotation reagents, cutting and soluble oils. Part 2: A compilation of data on all major commercially available surface-active agents which appeared on the world market up to the publication of the book. (L general, B14, G21)

941-L. Modern Metal Lithography. Ralph H. Graham. *Graphic Arts Monthly and the Printing Industry,* v. 24, Oct. 1952, p. 134, 136, 138, 140.

Various steps in the production of finished decorated metal. (L26)

942-L. Pretreatment Primers for Metal Work. E. E. Halls. *Industrial Chemist and Chemical Manufacturer,* v. 28, Oct. 1952, p. 441-445.

Compares results obtained with pretreatment primers and those given by other processes used to insure adhesion of paint and enamel finishes on ferrous and nonferrous metal surfaces. (L14)

943-L. Developments in Tests of Coatings for Steel Pipe. Graydon E. Burnett and Charles B. Masin. *Journal, American Water Works Association,* v. 44, Oct. 1952, p. 893-911.

Use of nonmetallic coatings to prevent corrosion of steel pipe, and tests to determine their efficiency. Tables and photographs. (L26, R11, CN)

944-L. Chemical and Anodic Treatments. *Light Metals,* v. 15, Oct. 1952, p. 333-335.

Tabular data on German patents. (L14, L19, Al, Mg)

945-L. An Electronic Finishing Process. John Starr. *Products Finishing,* v. 17, Oct. 1952, p. 42, 44, 46, 48, 50, 52, 54.

Purpose of the process is to ionize sprayed coating particles in a

high-voltage electric field so that particles are attracted to conveyer-grounded product surfaces. Diagrams and photographs. (L23, L26)

946-L. Electrochemical and Electrometallurgical Industries. H. R. Leech. *Reports on the Progress of Applied Chemistry,* v. 36, 1951, p. 292-316.

Review of progress in 1951. Electroplating, electrolytic polishing, electrolytic production, current rectification, primary cells, and electrometallurgy. Numerous references. (L13, L17, D8, C23)

947-L. (French.) **Formation of Alloys in Thin Layers by Evaporation in Vacuum of the Pure Constituents.** Pierre Michel. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 235, Aug. 4, 1952, p. 377-379.

Formation of Ag-Sn and Au-Cu alloys on a collodion support by simultaneous evaporation in vacuum. (L25, Ag, Cu, Sn)

948-L. (French.) **The Water Content of Electrolytic Polishing Solutions.** I. Epelboin. *Journal de Chimie Physique et de Physico-Chimie Biologique,* v. 49, July-Aug. 1952, p. C137-C140; disc., p. C141.

Importance of the problem and possible solutions. 17 ref. (L13)

949-L. (French.) **Importance of the Preparation of the Surface: Graining.** (Continued.) Roger Marpon. *Métallurgie et la Construction Mécanique,* v. 84, July 1952, p. 523, 525; Aug. 1952, p. 573, 575-577.

Application of graining prior to painting. Continuity of the film, study of a system for protection of grained sheet metal, and preparation of samples. Data for five paint systems are tabulated. Second installment: Results obtained upon aging through 8, 17, 56, 62, and 79 cycles. (L26, ST)

950-L. (French.) **Protective Coating of Metals Having a High Melting Point.** R. Kieffer and Nachtigall. *Métaux: Corrosion—Industries,* v. 27, July- Aug. 1952, p. 312-317.

Emphasis on siliconizing of Mo, W, Ta, and Cb by reaction of a gas on the surface of the metal, and by oxidation of the appropriate alloy. Data are tabulated. 34 ref. (L15, Mo, W, Ta, Cb, SG-h)

951-L. Suggestions on Methods of Testing Enamels. (In German.) A. Dietzel and W. Stegmaier. *Berichte der Deutschen Kermaischen Gesellschaft e. V. und des Vereins Deutscher Emailfachleute e. V.,* v. 29, Feb. 1952, p. 56-58; Mar. 1952, p. 88-92; Apr. 1952, p. 132-137; May 1952, p. 178-183.

Summarizes the most important methods of testing enamels, metals to be enameled, and enameled products; proposes new test methods. Data are tabulated. Numerous references. (To be continued.) (L27)

952-L. (German.) **Defective Sheets as Cause of Enamel Defects.** W. Heimsoeth and F. R. Meyer. *Berichte der Deutschen Keramischen Gesellschaft e. V. und des Vereins Deutscher Emailfachleute e. V.,* v. 29, July 1952, p. 234-241.

A series of investgiations shows hydrogen discharge, supersaturation of the base enamel with Fe compounds, and disturbing gas eruptions to be the main causes for these defects. Micrographs. (L27, CN)

953-L. (German.) **Surface Abrasion During Chemical and Electrolytic Polishing of Aluminum.** H. Fischer and L. Koch. *Metall,* v. 6, Sept. 1952, p. 491-496.

Mechanism for various processes. Types of baths, abrasion, corrosion-current density and gas discharge are shown in tabular form. Electron micrographs illustrate the progress of polishing. (L12, L13, Al)

954-L. (German.) **Surface Structure and Surface Hardness of Mechanically and Electrolytically Polished Copper.** K. H. Leise. *Metall,* v. 6, Sept. 1952, p. 496-497.

Compares results on the basis of electronic investigations of single crystals. Electron micrographs and diagrams. (L10, L12, Cu)

955-L. (German.) **The Significance of "Secondary" Inhibition for Electrolytic Deposition of Nickel.** J. Elze. *Metall,* v. 6, Sept. 1952, p. 500-504.

A review on the basis of the literature. The theory of inhibition, as formulated by H. Fisher; the influence of inhibition deposition temperature, and cathodic current density upon the structure of electrolytic Cu and Ni deposits. The mechanism of secondary inhibition. Micrographs. 13 ref. (L17, Ni)

956-L. (German.) **Hard-Chromium Plating of Aluminum.** E. Meyer-Rässler. *Metall,* v. 6, Sept. 1952, p. 504-509.

A review on the basis of the literature. The properties of Al and hard Cr, preliminary preparation of the Al surface, and the Cr plating operation. Micrographs. 15 ref. (L17, Cr, Al)

957-L. (German.) **Remarkable Zinc-Plating Cell.** Heinz Bablik. *Metall,* v. 6, Sept. 1952, p. 513-515.

Different types of Swedish Zn-plating cells which eliminate the many disadvantages of the iron cell.

They utilize electricity for heating purposes, and also differ in design from those used in Germany. (L17, Zn)

958-L. (German.) Calculation of Characteristic Data for Modern Continuous Pickling Plants. Walter Fackert. *Stahl und Eisen,* v. 72, Sept. 25, 1952, p. 1196-1207.

Descaling processes from the standpoint of modern rolling methods, present status of pickling processes, nature of the scale and its processes, nature of the scale and its solubility, mode of operation of modern continuous pickling plants, and interpretation of equilibria between amounts of acid, ferrous sulfate, and water in the fresh and spent solutions. Includes typical calculations and cost analysis. (L12, ST)

959-L. (German.) Progress in Infra-Red Technology, Applications and Results. Karl A. Lohausen. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, Aug. 21, 1952, p. 792-796.

Use of infrared radiators and ovens for the drying of lacquer on metals, glass, wood, and leather; and for the drying of paper, textiles, ceramic materials, and materials in grain or powder form. Application of "Vouten" radiators for heating of rooms. 12 ref. (L26)

960-L. Vacuum Metallizing as a Design Tool. J. Gordon Seiter. *Electrical Manufacturing,* v. 50, Nov. 1952, p. 148-149, 334, 336.

Technique which can be used to contribute desirable properties to component parts, reduce production costs, and speed up production rates. It is now largely used for coating of plastics. (L23)

961-L. The Influence of Sound and Ultrasound on Electro-Chemical Processes. Albert Roll. *Engineers' Digest,* v. 13, Aug. 1952, p. 257-260, 244; Sept. 1952, p. 314, 315, 316; Oct. 1952, p. 357-360. (Translated and condensed from *Metalloberfläche,* v. 4, 1952, p. B49-B53, B65-B70, B81-B89.)

Previously abstracted from original. See item 653-L, 1952. (L17, C23, Ni, Cu, Cr)

962-L. Hard Aluminum Finishes Resist Wear and Abrasion. R. V. Vanden Berg. *Iron Age,* v. 170, Oct. 30, 1952, p. 81-83.

Harder, thicker, and denser anodic surface coatings which have better resistance to wear and abrasion, are now available for Al. The combination may replace heavier metals for such things as gears, slides, pinions, pistons, and many aircraft applications. Other materials such as Cr, Sn, brass, and Pb have also been coated onto Al to give outstanding characteristics. (L19, Q9, T7, Al)

963-L. Speedy Plating of Small Diameter Steel Tubing. *Iron Age,* v. 170, Nov. 6, 1952, p. 174-175.

Unusual plating setup which applies Cu to small-diameter tubing in a continuous operation at Rochester Products Div. of General Motors Corp. At speeds of 40-150 ft. per min. on tube diameters of $\frac{5}{8}$-$\frac{3}{8}$ in., Cu coatings of 0.0004 in. are applied in a single pass. Another unusual setup is used in plating short lengths of automobile radio-antenna tubes. Formerly, heavy coatings of Cu and Ni and a final coat of Cr were applied but restrictions on use of Ni have forced a change to Zn-Cu-Cr coating. Laboratory and service tests show good corrosion resistance. (L17, Cu, Zn, Cr, ST)

964-L. The Reflectivity of Copper Electrodeposits. W. H. Gauvin and C. A. Winkler. *Journal of the Electrochemical Society,* v. 99, Nov. 1952, p. 447-449.

Apparatus and procedure, reflectivity in the absence of an addition agent and in its presence, and measurement of diffuse reflection. Graphs. 16 ref. (L17, P17, Cu)

965-L. Cathode Polarization Potential During the Electrodeposition of Copper. III. Effect of the Cathode Base Upon the Cathode Polarization Potential and the Crystal Structure of the Deposit. L. L. Shreir and J. W. Smith. *Journal of the Electrochemical Society,* v. 99, Nov. 1952, p. 450-456.

Graphs and micrographs. 12 ref. (L17, Cu)

966-L. American Specifications for Phosphate Coatings. *Product Finishing,* v. 5, Oct. 1952, p. 49-53.

U. S. government specifications for use of phosphate coatings in improvement of paint adhesion, protection against corrosion, and protection of bearing surfaces against rust. (L14)

967-L. Dewatering Fluids. *Product Finishing,* v. 5, Oct. 1952, p. 80-89.

Experiments to show merits of fluids for preventing corrosion by removal of water from metal surfaces. Diagrams of equipment. Industrial applications in finishing processes for Mg, Cd, Cr, Cu, Ni, and steel in particular. (L general, R10, ST, Mg, Cd, Cr, Cu, Ni)

968-L. Ultrasonic Cleaning Pays Off for Small Parts. *Steel,* v. 131, Nov. 3, 1952, p. 92-93.

A high-frequency sound wave is beamed through the cleaning solvent or surface detergent to the surface of the submerged workpiece. (L10)

969-L. (German.) **Enriching the Surface of Unalloyed Steel With Tungsten or Molybdenum From Salt Baths.** Erich Fitzer. *Archiv für das Eisenhüttenwesen,* v. 23, Sept.-Oct. 1952, p. 369-375.

Surface-diffusion experiments were made for the twofold purpose of saving scarce or expensive metals and of imparting certain surface properties to finished parts of steel or cast iron. Treating the metal in Na tungstate or molybdate baths is shown to increase surface hardness considerably. Effects of time and temperature. Tables, graphs, and photomicrographs. 17 ref. (L15, J28, CN, CI)

970-L. (German.) **More Modern Methods of Pickling Iron and Steel.** Erwin Brauns. *Metalloberfläche,* sec. A, v. 6, Oct. 1952, p. A145-A152.

Procedure, advantages, and limitations. Some American pickling methods are less practical in Germany, because of Germany's lack of natural gas. Graphs. 18 ref. (L12, Fe, ST)

971-L. (German.) **Pickling as a Preparation for Surface Improvement.** R. Petri. *Metalloberfläche,* sec. A, v. 6, Oct. 1952, p. A152-A158.

Effect of chemical and electrolytic pickling with and without inhibitors on the surface roughness and possible film deposition of metals to be electroplated. Photomicrographs, tables, and graphs. (L12)

972-L. (German.) **Procedure and Equipment of Pickling Nonferrous Metals.** Heinz W. Dettner. *Metalloberfläche,* sec. B, v. 4, Oct. 1952, p. B152-B159.

Compositions of pickling baths for Cu and Cu alloys, Ni and Ni alloys, light metals, soft metals (Pb, Sb, Britannia metal, and Zn), and noble metals. Equipment and tabulated data. 37 ref. (L12, EG-a)

973-L. (German.) **The Testing of Tin Deposits on Copper Wires.** Helmut Meiswinkel. *Werkstoffe und Korrosion,* v. 3, Sept.-Oct.. 1952, p. 355-357.

Various chemical test methods. Results of tests show advantages of electrolytic plating over hot-dip tinning of wires. Data are charted. (L17, Sn, Cu)

974-L. (German.) **Tinning Aluminum With the Aid of Ultrasonics.** Paul Wenk and Heinrich Boljahn. *Zeitschrift für Metallkunde,* v. 43, Sept. 1952, p. 322-324.

A new method and equipment for tinning and soldering Al parts. Photographs, diagrams, and photomicrographs. (L16, K7, Al)

975-L. Tests Prove Ceramic Coatings Prevent Stainless Steel Absorption of Carbon. *Ceramic Industry,* v. 59, Nov. 1952, p. 69.

Application of NBS ceramic coatings A-417 and A-19H to 18-8 stainless steel to prevent adsorption of carbon. (L27, SS)

976-L. Service and Operation Simplified With Wet Blasting. Eugene Anderson. *Industry and Power,* v. 63, Nov. 1952, p. 88-91.

The process and its applications to plastic molds, glass molds, forging dies, and die-casting dies. Photographs. (L10, ST)

977-L. Radioactive Tracers Track Metal Cleaner Effectiveness. J. W. Hensley. *Iron Age,* v. 170, Nov. 13, 1952, p. 151-154.

Use of tracers to study corrosion attack by cleaners, and in evaluation of cleaning effectiveness using soils tagged with radioactive atoms. (L12, R11)

978-L. Porcelain Enamels Serve and Save for Industry. W. A. Barrows. *Iron Age,* v. 170, Nov. 13, 1952, p. 160-161.

Use to coat black steel pipe used for fluxing and degassing Al. (L27, CN)

979-L. Review of Surface Finish Literature. (Continued.) John W. Sawyer. *Machine Design,* v. 24, Oct. 1952, p. 328, 331-333, 334, 336, 338, 340, 342, 344, 346, 348; Nov. 1952, p. 286, 288, 290, 292, 294.

Bibliography of literature published during years 1945, 1946, and 1947. Includes brief abstracts. Concluding part consists entirely of subject index to first two parts. (L general)

980-L. Economical Finishing With Vacuum Metalizing. George W. Carr. *Metal Finishing,* v. 50, Nov. 1952, p. 60-64.

Advantages and applications of the process. Equipment. (L25)

981-L. Anodizing Aluminum With Sulfamic Acid; Comparison of Sulfuric, Oxalic, and Sulfamic Acid Processes. (Concluded.) Sakae Tajima, Yasuyuki Kimura and Toshiro Fukushima. *Metal Finishing,* v. 50, Nov. 1952, p. 65-69, 74.

Experimental procedure and results. Includes data on resistance to corrosion and abrasion. Graphs. 10 ref. (L19, R general, Q9, Al)

982-L. Electrodeposition of Zinc on Uranium Metal. Louis Silverman. *Metal Finishing,* v. 50, Nov. 1952, p. 75.

Cleaning cycle, chemical plating bath, and plating operation. (L17, Zn, U)

983-L. Nomogram for Analysis of Watts Type Nickel Plating Solutions. I. Goldman. *Metal Finishing,* v. 50, Nov. 1952, p. 76-77.

984-L. Automatically Controlled Galvanizing Kettles. *Metal Industry,* v. 81, Oct. 31, 1952, p. 349-350.

Pneumatic and electrical automatic control systems for metal galvanizing. Use of either depends on working conditions and desired accuracy of control. (L16, Zn, CN)

985-L. An Experience in Electrolytic Etching. W. B. Hislop. *Process Engravers' Monthly,* v. 59, Oct. 1952, p. 293-294.

Use for halftone work on Cu with hot-top enamel. Experiences of past 20 years. (L13, Cu)

986-L. Composite Metals: A New Key to Design Flexibility. Jerome Ottmar. *Product Engineering,* v. 23, Nov. 1952, p. 153-157.

Metallurgically bonded metal combinations can be used to overcome limitations of single metals and to conserve critical and costly materials. Variety of composites now available include Al-base composites, Fe and steel-base composites, stainless-steel-clad metals, special spring materials, brazing metal cladding, thermostat metals, rare and precious-metal clad materials, and lead-clad metals. Photographs and tables.
(L24, Al, ST, CN, SG-b, f, s, EG-c)

987-L. Hard Chrome Plating on Aircraft Parts. Gilbert C. Close. *Products Finishing,* v. 17, Nov. 1952, p. 32-36, 38, 40.

General discussion.
(L17, Cr, CN, AY)

988-L. Performance of Pre-Treatment Primers as Revealed by Accelerated Tests. *Products Finishing,* v. 17, Nov. 1952, p. 46, 48, 52, 54, 56.

General discussion with tabulated data. The primers were applied to Al sheet, 60-40 brass sheet, and mild steel sheets—bare and with Sn, Zn, and Cd coatings. Different chemical pretreatments were used.
(L14, Al, Cu, CN)

989-L. Abrasive Tumbling Offers Finishing Economies. Allen G. Gray. *Products Finishing,* v. 17, Nov. 1952, p. 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88.

Application at General Electric's West Lynn Meter and Instrument Works, for finishing of numerous small parts. Abrasive tumbling, rolling, burnishing, barrel finishing with Al_2O_3, and application to Zn die castings and steel stampings. (L10)

990-L. Surface Treatment and Finishing of Light Metals, Part 7. S. Wernick. *Sheet Metal Industries,* v. 29, Nov. 1952, p. 1027-1036.

Thickness determination, porosity, adhesion, corrosion resistance, and thermal properties. Tables. 76 ref.
(L general, R general, Al, Mg)

991-L. Silica-Free Enamels. B. K. Niklewski. *Sheet Metal Industries,* v. 29, Nov. 1952, p. 1037-1038, 1040.

Fifty enamels suitable for application to Al in the system P_2O_5-Al_2O_3-B_2O_3 were studied. One particular composition was chosen for further investigation. (L27, Al)

992-L. Volume Plating Method Increases Gun Tube Life. *Steel,* v. 131, Nov. 1952, p. 89.

Brief general discussion. (L17, ST)

993-L. Silver Plating. R. Ruedy. *Technical Information Service, National Research Council* (Canada), Report 10, Aug. 1950, 14 pages.

14 references. (L17, Ag)

994-L. Kinetics of the Formation of Oxide Films on Nickel Foil. Walter J. Moore and James K. Lee. *Transactions of the Faraday Society,* v. 48, Oct. 1952, p. 916-920.

Rate of growth of layers of nickel oxide on Ni was studied from 400 to 900° C. at 10 cm. O_2 pressure. Graphs. 13 ref. (L14, Ni)

995-L. Unionmelt Cladding of Mild Steel Roll by Series-Arc Technique. J. F. Collins, H. I. Shrubsall, and J. L. Wilson. *Welding Journal,* v. 31, Nov. 1952, p. 1050-1051.

Technique for depositing AISI Type 501 metal on a mild steel roll. (L24, CN, SS)

996-L. (German.) **The Alodine Process.** H. Ketterl. *Aluminium,* v. 28, Oct. 1952, p. 346-349.

The process, film characteristics, and successful installations. (L14, Al)

997-L. (Italian.) **Protective Treatment of Magnesium Surfaces.** G. P. Bolognesi and E. Mantovani. *Metallurgia Italiana,* v. 44, Aug.-Sept. 1952, p. 336-342.

Tests for various surface treatments on two types of Mg alloys. Results of alternate-immersion, salt-spray, and atmospheric exposure tests. 10 ref. (L general, R11, Mg)

998-L. (Italian.) **Evaluation of the True Efficiency of Pickling Inhibitors.** Leo Cavallaro and Liliana Felloni. *Metallurgia Italiana,* v. 44, Aug.-Sept. 1952, p. 366-370.

Various organic compounds were investigated with respect to their inhibitive effect on pickling of carbon steels. Results are tabulated and interpreted. (L12, CN)

SECTION M

METALLOGRAPHY, CONSTITUTION and PRIMARY STRUCTURES

1-M. High-Temperature Thermal Analysis Using the Tungsten/Molybdenum Thermocouple. H. T. Greenaway, S. T. M. Johnstone, and Marion K. McQuillan. *Journal of the Institute of Metals,* v. 80, Nov. 1951, p. 109-114.

Technique which makes it possible to conduct thermal analyses at temperatures up to 2000° C. High-frequency induction heating is used, and the temperature is measured by means of a W-Mo thermocouple, for which a calibration curve is given. The method has been applied to the determination of the freezing point of pure Cr, which is shown to be 1845° ± 10° C., and the liquidus curve for the solid solution of Mn in Cr.
(M23, S16, Mn, Cr, W, Mo, SG-a)

2-M. The Alloys of Molybdenum and Tantalum. G. A. Geach and D. Summers-Smith. *Journal of the Institute of Metals,* v. 80, Nov. 1951, p. 143-146.

Investigation of the system Mo-Ta showed that these metals form a continuous series of solid solutions. No superlattice was detected and no anomalies occur between true and X-ray densities. Approximate melting points of the alloys were also determined. Alloys of the transition metals of Groups IVA, VA, and VIA with each other are discussed briefly. 16 ref. (M24, Mo, Ta)

3-M. Structure of Amorphous Aluminium Oxide Films. *Nature,* Oct. 6, 1951, p. 600-601.

Results of investigation. Refers to the oxide layer formed on Al by atmospheric oxidation.
(M27, R2, Al)

4-M. Statistical Theory of Properties of Solid Solutions. R. Smoluchowski. *Physical Review,* ser. 2, v. 84, Nov. 1, 1951, p. 511-518.

Properties of binary solid solutions are considered from the point of view of the fluctuation of local composition in the crystalline lattice. These variations influence the properties of the alloys by varying the corresponding local concentration of electrons. A simple general statistical method for calculating properties of random and ordered solid solutions. The theory is applied to saturation magnetization, temperature coefficient of electrical resistivity, thermo-electric power, and other properties of various alloys. 20 ref. (M26, P general)

5-M. Metallography of Alloys of Titanium With Oxygen, Carbon and Nitrogen. Thomas Redden and Mary Jane Field. *Steel,* v. 129, Nov. 19, 1951, p. 88-90.

Results of tensile strength, elongation, and hardness tests; also results of microstructural examination. (M27, Q27, Q29, Ti)

6-M. The Atomic and Electronic Structure of Metals. R. B. Bentley. *Metallurgia,* v. 44, Oct. 1951, p. 191-192.

Condensed from a lecture. (M25)

7-M. Applications of Electronic and Atomic Theories to the Structure and Properties of Alloys. E. W. Fell. *Metallurgia,* v. 44, Oct. 1951, p. 192-194.

The Hume-Rothery Rule; the electronegative valency effect; the relative valency effect; form and position of phase boundaries; superlattices. 5 ref. (M26, N10, P13)

8-M. Crystallographic Angles for Tin. J. F. Nicholas. *Journal of Metals,* v. 3, Dec. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1142.

Results of precise calculations.
(M26, Sn)

9-M. Constitution of Titanium-Aluminum Alloys. H. R. Ogden, D. J. Maykuth, W. L. Finlay, and R. I. Jaffee. *Journal of Metals,* v. 3, Dec. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1150-1155.

Al was found to be soluble in α-Ti to about 26% and to raise the temperature range of transformation from α to β. Two intermediate phases exist in the system, a new face-centered tetrogonal phase, designated as γ, which occurs between 34 and 46% Al, and $TiAl_3$. Metallographic and X-ray diffraction data were used to determine the diagram. (M24, Ti, Al)

10-M. Useful Etchants for Electron Metallography. William L. Grube. *Journal of Metals,* v. 3, Dec. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1171-1173.

Relative merits of various types. Comparative photomicrographs at 5000x show results obtained with different etchants on different phases of steel and on cemented carbides and Vitallium. (M21, ST, Co, C-n)

11-M. Analytical Representation of Certain Phase Boundaries. W. Rostoker. *Journal of Metals,* v. 3, Dec. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1203-1205.

Using an expression for the free energy of a homogeneous phase as a function of composition, a relationship is derived which interrelates the phase boundaries extending from the allotropic transformation of the solvent metal. Observed and calculated phase boundaries in the system Fe-Ni, Fe-Mn, Fe-Mo, and Ti-Cb are compared. (M24, P12, Fe, Ni, Mn, W, Mo, Ti, Cb)

12-M. Uranium Sesquicarbide. M. W. Mallet, A. F. Gerds, and D. A. Vaughan. *Journal of the Electrochemical Society,* v. 98, Dec. 1951, p. 505-509.

Preparation and properties. It was found that U_2C_3 can be formed from a mixture of UC and UC_2. Crystal structure was found to be body-centered cubic. Micrographs. (M26, C-n)

13-M. Photomicrography in Colour by Reflected Light With Special Reference to Metals. K. J. B. Wolfe. *Photographic Journal,* v. 91B, Sept.-Oct. 1951, p. 94-98.

Normal methods used for the preparation of metallic specimens for micro-examination and salient features of the metallurgical microscope or metallograph. The application of plane polarized light for the identification of nonmetallic inclusions. Methods using the Vickers projection microscope, for the production of transparencies of Kodachrome and Dufaycolor. Methods used for making paper prints by the Autotype "Trichrome Carbro" and the Kodak "Dye Transfer" processes. An alternative method available in the U. S. 16 ref. (M21)

14-M. A Simple Reflecting Microscope for High-Temperature Metallography. D. W. Dewhirst and M. J. Olney. *Journal of the Iron and Steel Institute,* v. 169, Nov. 1951, p. 221-227.

Design, construction, and adjustment of a simple reflecting microscope with a bispherical monocentric objective of 0.5 N.A. and 17 mm. working distance, with information on photographic techniques. A complete apparatus for the examination of specimens in vacuo at temperatures up to 1000° C., and some typical results obtained by its use. 37 ref. (M21)

15-M. Summarized Proceedings of Conference on Metals, Leamington Spa, April, 1951. *British Journal of Applied Physics,* v. 2, Nov. 1951, p. 305-318.

A summary of 18 papers on the texture and structure of metals presented at a conference of the Institute of Physics. 95 ref. (M26, M27)

16-M. The Diffraction Pattern of Cold Worked Metals: I. The Nature of Extinction. II. Changes in Integrated Intensity. W. H. Hall and G. K. Williamson. *Proceedings of the Physical Society,* v. 64, sec. B, Nov. 1, 1951, p. 937-953.

Part I: Experimental results for chemically produced Cu and annealed Al filings were obtained with a Geiger-counter spectrometer using monochromatic radiation. Evidence shows that annealed metals contain residual lattice strain, in accord with dislocation theory. Part II: Measurements were made, using a Geiger-counter spectrometer, of the changes produced by cold work on the integrated intensities in the Debye-Scherrer spectrum of Al. 33 ref. (M22, Cu, Al)

17-M. Outer Brillouin Zones for Face-Centred and Body-Centred Cubic Lattices. J. F. Nicholas. *Proceedings of the Physical Society,* v. 64, sec. B, Nov. 1, 1951, p. 953-956.

In order to resolve some inconsistencies in the literature on the 2nd Brillouin zones of cubic lattices, the shapes of these zones were recalculated. Results, together with descriptions of the 3rd and 4th zones. (M26)

18-M. Structure of $Cu_{32}Al_{19}$. A. J. Bradley. *Nature,* v. 168, Oct. 13, 1951, p. 661.

Electrons are grouped such that the structure remains electrically neutral at every point. (M26, Cu)

19-M. Contribution to the Study of the Iron-Phosphorus Diagram. Study

of the Testing of Phosphide Grains. (In French.) P. Roquet and G. Jegaden. *Revue de Métallurgie,* v. 48, Sept. 1951, p. 712-721; Oct. 1951, p. 793-810.

A comprehensive experimental study. First part: The gamma-phase section of the diagram for bessemer steels and for P contents between 0.05 and 0.3%. Second part: The structure of ingots and plates. Optimum conditions of casting and of forging. 19 ref. (M24, D9, Fe, ST)

20-M. Some Examples of the Application of Semi-Microradiography to the Examination of Cast Aluminum Alloys. (In French.) A. Lahodny and F. Nonveiller. *Revue de Métallurgie,* v. 48, Oct. 1951, p. 778-786; disc., p. 786.

Laboratory tests on Al-Cu-Mg billets produced by ingot and continuous casting. Semimicroradiography can be useful for examining the crystallization process of light alloys if they contain constituents which absorb X-rays differently, and for examining large specimens. 10 ref. (M23, Al)

21-M. Use of Colored Films to Study Changes in Micrographic Structure of Type 80-20 Refractory Nickel-Chromium Alloys. (In French.) Charlotte Bückle and Jean Poulignier. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 233, Oct. 15, 1951, p. 869-871.

Use of colored films formed on the surfaces of above alloys on attack by a boiling solution of 5 cc. conc. HF, 3cc. conc. HCl, and 50 cc. ethyl alcohol, to study structure changes due to aging for various times and temperatures. (M23, Ni, SG-h)

22-M. A New Surface Structure of "Stretched" Aluminum. (In German.) Heinz Wilsdorf and Doris Kuhlmann-Wilsdorf. *Naturwissenschaften,* v. 38, 1st Nov. no., 1951, p. 502.

The replica process is a preferred method of electron microscopy for showing the slip planes of elongated Al. (M21, Al)

23-M. Structure Investigations in the Aluminum Corner of the Aluminum-Iron-Silicon System. (In German.) L. Holik, H. Nowotny, and W. Thury. *Berg und Hüttenmännische Monatshefte der Montanistischen Hochschule in Leoben,* v. 96, Sept. 1951, p. 181-184.

Photomicrographs and graphs supplement brief discussion. 12 ref. (M24, Al)

24-M. The Cast Iron—Steel Limiting Alloy. (In Italian.) Giordano Bruni. *Metallurgia Italiana,* v. 43, Oct. 1951, p. 435-438.

There are two fundamental types of saturated austenite. One contains $Fe_{12}C$ and the other $Fe_{13}C$. Phase relationships involved. 20 ref. (M24, N8, CI, ST)

25-M. The Technique of Microradiography by Absorption and Some Examples of Application of This Method to Metallographic Investigations. (In Polish.) Z. Bojarski. *Prace Glownego Instytutu Metalurgii,* v. 3, no. 5, 1951, p. 417-428.

A theoretical approach to the methods used in microradiography and possibility of application these methods to practical problems. The microradiographic absorption method is developed. Practical instructions for preparation of target elements and selection of wave-length of radiation and voltage. 12 ref. (M23)

26-M. Experiment on Application of Electron-Microscopic Method to Investigation of Ores. (In Russian.) A. A. Ivanov. *Zapiski Vsesoyuznogo Mineralogicheskogo Obshchestva,* ser. 2, v. 80, no. 3, 1951, p. 167-174.

Applicability of electron microscopy, using the oblique-replica method, to mineralogical investigation of highly dispersed substances is confirmed by investigation of dispersion of fine gold particles within the grains of pyrite, as well as at the grain boundaries. (M21)

27-M. (Book) **Phase Microscopy; Principles and Applications.** Alva H. Bennett, Helen Jupnik, Harold Osterberg, and Oscar W. Richards. 320 pages. 1951, John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y.

The authors have individually written the various chapters covering their specialties. Includes theory, instrumentation, techniques and applications. (M21)

28-M. (Book) **Grundlagen der Metallkunde.** (Fundamentals of Metalworking). Ed. 3, George Masing. 148 pages. 1951. Springer Verlag, Berlin, Germany. 12.60 D.M.

A collection of the author's university lectures. Differs from other textbooks on the same subject by its brevity and its restriction to principles. Technical problems, however, are also outlined. Starts with a survey of the problems and covers in 11 chapters a wide range of practical applications such as atomic structure, crystalline formation of alloys, thermochemical treatment, plastic forming, recrystallization, behavior against nonmetallic methods of attack, etc. (From review in *Chemical Age.)* (M25, M26, N general, Q24)

29-M. The Electron Microscope and Its Industrial Applications. J. W. Sharpe. *Chemistry & Industry,* Nov. 17, 1951, p. 976-981.

Uses in metallurgical studies, chemical research, industrial dust

studies, rubber manufacture, and pigment and paint studies. 12 ref. (M21)

30-M. The Preparation and the Crystal Structures of Cobalt Nitride, Co_2N, of Cobalt Carbonitrides, $Co_2(C, N)$ and of Cobalt Carbide, Co_2C. J. Clarke and K. H. Jack. *Chemistry & Industry,* Nov. 17, 1951, p. 1004-1005.

10 references. (M26, Co)

31-M. The Uranium-Carbon System. M. W. Mallett, A. F. Gerds, and H. R. Nelson. *U. S. Atomic Energy Commission.* AECD-3226, Apr. 1, 1951, 32 pages.

Results of investigation. Gives the constitution diagram on the basis of melting point, X-ray, and metallographic data. (M24, V, C)

32-M. Structure and Mechanical Properties of a Mo-Ni-Cr Cast Iron. Edward A. Loria. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 353-357; disc., p. 357-359.

Previously abstracted from Preprint 8. See item 117-M, 1951. (M27, Q general, CI)

33-M. Effects of Certain Elements on Grain Size of Cast Copper-Base Alloys. R. A. Colton and M. Margolis. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 360-368; disc., p. 368-371.

Results of experiments to determine the effect of Ni on the grain size of Cu + 5% Pb, Cu + 5% Sn, Cu + 5% Zn and high-purity 85-5-5-5 alloy. (M27, Cu)

34-M. X-Ray and Electron-Diffraction Studies of Lubricating Surfaces. R. Brill. *Annals of the New York Academy of Sciences,* v. 53, art. 4, June 27, 1951, p. 824-835.

Reviews investigations on the structure of surface films for the case of boundary lubrication. Effect of stabilizing agents; structure of polished metal surfaces. 29 ref. (M27, M22)

35-M. What Is a Metal? Robert Maddin. *Chemistry,* v. 25, Dec. 1951, p. 18-25. (Reprinted from *Johns Hopkins Magazine.*)

Starts with growth of the metallic crystal, and gives results of physical and mechanical tests run on these single crystals. Illustrated. (M26)

36-M. Spheroidal Cast Irons. Albert M. Portevin. *Metal Progress,* v. 60, Dec. 1951, p. 82.

Metallographic structure. (M27, CI)

37-M. Chemical Brightening of Aluminium and Light Alloys. J. Hérenguel. *Metal Treatment and Drop Forging,* v. 18, Dec. 1951, p. 539-542.

French work on chemical brightening, which adds to techniques for the metallographic study of aluminum alloys, and also has industrial applications. It is complementary to, rather than competitive with, electropolishing. (M21, L12, Al)

38-M. Metallography at Elevated Temperatures; Possibility of Gaseous Etching in New French Technique. J. Maréchal and M. Doucet. *Metal Treatment and Drop Forging,* v. 18, Dec. 1951, p. 565-571.

A technique and apparatus for examining structural changes of metal specimens at elevated temperatures. Results of work and the possibility of using gaseous etching on samples of Cu. Photomicrographs. (M21, Cu)

39-M. Asymmetrical Electron Diffraction Effects From Single Crystals of Silver. G. P. Thomson. *Proceedings of the Physical Society,* v. 64, sec. A, Dec. 1, 1951, p. 1113-1124.

Silver crystal surfaces, prepared by either electrolytic etching or electrolytic polishing, were studied by means of the electron-diffraction reflection technique. The fine structure effects showed certain asymmetries which do not immediately follow from Laue diffraction theory. Possible causes of these asymmetries are probably due to distortion of the silver crystals, or refraction effects. (M22, Ag)

40-M. A Scanning Device for Precision Determination of Lattice Parameters at Constant Temperatures. M. E. Straumanis and E. Z. Aka. *Review of Scientific Instruments,* v. 22, Nov. 1951, p. 843-844.

Lattice-parameter determinations can now be made with a precision of 0.0005% using powder or rotating-crystal methods and asymmetric film arrangement. Illustration and diagram. (M26)

41-M. Zirconium-Titanium System: Constitution Diagram and Properties. Earl T. Hayes, A. H. Roberson, and O. G. Paasche. *U. S. Bureau of Mines,* Report of Investigations 4826, Nov. 1951, 11 pages.

The Zr-Ti system was investigated over the entire range of compositions using both graphite-melted and arc-melted alloys. Thermal analysis, resistivity measurements, melting-point studies, and X-ray analysis were used to determine the phase relationships. Tests on mechanical properties were made. Tables and graphs. (M24, Q general, Ti, Zr)

42-M. Examples of Practical Use of X-Ray Diffraction Apparatus in Metallurgy. (In Czech.) P. Skulari. *Hutnické Listy,* v. 6, Oct. 1951, p. 489-494.

Some characteristic examples. (M22, S13)

43-M. Methods for Preparing and Examining Large Metallic Crystals. (In French.) Paul LaCombe. *Métaux: Corrosion—Industries,* v. 26, Oct. 1951, p. 392-409.

Seven different methods for preparing and examining single crystals and polycrystalline specimens. 58 ref. (M21)

44-M. Method of Identifying the Crystallographic Characteristics of Deformation and Fracture in Polycrystalline Solids. (In French.) C., A. Zapffe and F. K. Landgraf. *Revue de Métallurgie,* v. 48, Nov. 1951, p. 811-821.

"Fractographic" procedure. The crystallographic characteristics of Bi and Sb were studied. Fractographs, sketches, and tables. 17 ref. (M23, Bi, Sb)

45-M. Etch Patterns Produced Anodic Attack on Aluminum. Raymond Jacquesson and Jack Manenc. (In French.) *Revue de Métallurgie,* v. 48, Nov. 1951, p. 879-882.

A new process for studying crystal orientation in cold-worked Al. Illustrated. (M21, Al)

46-M. Certain Crystallo-Chemical Anomalies in the Systems Mg-Zn and Mg-Al-Cu. (In Russian.) M. S. Mirgalovskaia. *Doklady Akademii Nauk SSSR,* new ser., v. 78, June 11, 1951, p. 909-911.

Crystallographic anomalies exist in the Mg-Al-Cu system similar to those in the Mg-Zn system, in particular for MgZn, $MgZn_2$, and $MgZn_5$. Data are charted. (M26, Mg, Zn, Al, Cu)

47-M. Basic Pattern of Phase Equilibrium in Highly Coercive Fe-Ni-Al Alloys. O. S. Ivanov. *Doklady Akademii Nauk SSSR,* new ser., v. 78, June 21, 1951, p. 1157-1160.

Equilibrium diagrams for Fe-Ni-Al and for the 50 atm.% sections of the system were determined by physical properties, microstructures, thermal-expansion, and electrical-conductivity tests. (M24, Fe, Al, Ni)

48-M. Submicroscopic Structure of "Alni" Alloy. (In Russian.) N. N. Buinov and R. M. Lerinman. *Doklady Akademii Nauk SSSR,* new ser., v. 79, July 1, 1951, p. 69-72.

Electron microscope study shows structural differences of an alloy containing 25% Ni, 14% Al, 0.15% Cu, balance Fe, for different heat treatments. Corresponding coercive-force values are given. Photomicrographs. (M27, P16, Al, Ni, Fe)

49-M. Structures of Iron-Nickel-Aluminum Alloys for Permanent Magnets. (In Russian.) Iu Skakov. *Doklady Akademii Nauk SSSR,* new ser., v. 79, July 1, 1951, p. 77-80.

Metallographic analysis of Fe-Al-Ni alloys by means of optical and electron microscopes provides data for adding to and correcting Bradley and Taylor's diagram for this system. (M27, Fe, Al, Ni, SG-n)

50-M. Graphite; Its Crystal Structure in Cast Iron. W. S. Owen and B. G. Street. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 575-577; disc., p. 635-636.

Previously abstracted from *Journal of the Iron & Steel Institute.* See item 71-M, 1951. (M26, N8, CI)

51-M Carbide Phase; Structure in Iron-Carbon-Silicon Alloys. W. S. Owen. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 577-579; disc., p. 635-636.

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 72-M, 1951. (M24, M26, CI, Fe)

52-M. Carbon; Metallography in 4% Silicon-Iron Alloys. E. D. Harry. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 580-583; disc., p. 637-639.

Previously abstracted from the *Journal of the Iron and Steel Institute.* See item 100-M, 1951. (M26, N8, Fe)

53-M. Solid Solutions; Classification of the Solubilities of Elements in Iron. Part II and III. I. I. Kornilov. *Iron & Steel,* v. 25, Jan. 1952, p. 25-30. (Translated from *Izvestiia Akademii Nauk SSSR)*

Part II: A classification of solid solutions higher than binary involving iron, based on the atomic diameters of the elements which form continuous (binary) solid solutions with iron and among themselves. Corresponding to the two modifications of iron (α and γ), two classes of continuous solid solutions are considered: ferritic and austenitic. Part III: From the relation of the atomic diameters of the elements and of iron, a group of elements with a difference of atomic diameters of 8-15% which form binary limited solid solutions with iron is isolated. A systemization of ternary, quaternary, and higher limited solid solutions of ferrite is given on the basis of these elements, and the number of possible systems is calculated. 27 ref. (M24, Fe)

54-M. The Experimental Determination of the Distribution of the Valence Electrons in Crystals. (In English.) *Acta Crystallographica,* v. 4, Nov. 1951, p. 481-482.

Work of Ageev and coworkers on above for Al, Ni, and NiAl. Possible inaccuracies. 13 ref. (M26, Al, Ni)

55-M. A New Approach to Crystal-Structure Analysis. (In English.) M. J. Buerger. *Acta Crystallographica,* v.

4, Nov. 1951, p. 531-544.

Vector-set methods are applied to the solution of Patterson syntheses. The relation between these methods and those of Clastre and Gay, Garrido, Robertson, and McLachlan. (M26)

56-M. The Determination of Interplanar Spacings and Cell Dimensions From Powder Photographs Using an Internal Standard. (In English.) K. W. Andrews. *Acta Crystallographica,* v. 4, Nov. 1951, p. 562-563.

Typical data are charted. (M26)

57-M. (Book) **Typical Microstructures of Cast Iron.** 54 pages. 1951. British Cast Iron Research Association, Alvechurch, Birmingham, England. 15s. to members; 21s. to nonmembers.

A series of photomicrographs of the principal types of cast iron normally encountered by the metallurgist and engineer, at magnifications to which they are accustomed, are grouped under constituents of cast iron, unalloyed cast irons, special and alloy cast irons, and malleable cast irons. A few photomicrographs illustrate some of the more common defects encountered in iron castings. (M27, CI)

58-M. Constitution of the System Gallium-Indium. John P. Denny, J. Hugh Hamilton, and John R. Lewis. *Journal of Metals,* v. 4, Jan. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 39-42.

Constitution was determined by thermal methods. An experimentally determined metastable equilibrium line (an extension of the In-rich liquidus) was obtained. The various alloys were studied metallographically using polished samples obtained by a casting method. Photomicrographs. (M24, Ga, In)

59-M. Constitution and Properties of Some Iron-Bearing Cupro-Nickels. E. W. Palmer and F. H. Wilson. *Journal of Metals,* v. 4, Jan. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 55-64.

Constitution of alloys in the Cu-rich corner of the system, and variations in hardness and tensile properties resulting from heat treatment of alloys containing various amounts of Fe. Most of this work is concerned with alloys containing 10% Ni. With over 0.75% Fe, the 10% Ni alloy is susceptible to precipitation hardening. Consequences of this fact in connection with commercial production. Results are graphed and tabulated. (M24, Q27, Q29, Cu)

60-M. Crystal Structure of TiAl. Pol Duwez and Jack L. Taylor. *Journal of Metals,* v. 4, Jan. 1952, *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 70-71.

The present knowledge of the Ti-Al system is limited to the portion of the diagram extending from pure Al to the intermetallic compound $TiAl_3$. From an X-ray diffraction study of alloys containing up to 75% Al ($TiAl_3$), the phase boundaries at 750° C. were located. Crystal structure of a new phase is described. (M24, M26, Ti, Al)

61-M. Crystal Structure of $TaCr_2$ and $CbCr_2$. Pol Duwez and Howard Martens. *Journal of Metals,* v. 4, Jan. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 72-74.

The only intermediate phases in both the Ta-Cr and the Cb-Cr systems correspond to the ideal stoichiometric ratio $TaCr_2$ or $CbCr_2$. Both structures are cubic, $MgCu_2$ type. At high temperature, however, $TaCr_2$ has a hexagonal $MgZn_2$-type structure, which can be retained at room temperature by fast cooling. Tabulated diffraction data. (M26, Ta, Cr, Cb)

62-M. A Sensitive Method for Thermal Analysis of Very Low Melting Alloys. R. M. Evans, E. O. Fromm, and R. I. Jaffee. *Journal of Metals,* v. 4, Jan. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 74-75.

Apparatus and method developed for work in the range −72 to 250° C., but adaptable to broader temperature ranges. Typical data for a Ga-rich Ga-Sn-Zn alloy are charted. (M23, Ga)

63-M. Method for Locating Two-Liquid Immiscibility Limits. R. E. Bish. *Journal of Metals,* v. 4, Jan. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 81-82.

Method consists essentially in the measurement of the local electrical resistivity at a sequence of levels in the molten bath. Where a change of phase is encountered, the resistivity changes sharply. This measurement was made by use of a tungsten-wire probe for the Cu-Pb system. (M24, Cu, Pb)

64-M. The Crystal Structures of Some Thorium and Uranium Compounds. Norman Charles Baenziger. *U. S. Atomic Energy Commission,* AECD-3237, Oct. 15, 1948, 114 pages.

Isostructural compounds with the composition U_6M and Th_7M_3 (where M = Fe, Co, or Ni) were found and their structures determined. Single crystals, examined by the rotation, oscillation, Laue and Weissenberg methods, exhibited diffraction sym-

metry. A new method for determination of X-ray intensities. Data are tabulated. 61 ref. (M26, U, Th)

65-M. Compounds of Thorium With Transition Metals. I. The Thorium-Manganese System. John V. Florio, R. E. Rundle, and A. I. Snow. *U. S. Atomic Energy Commission,* AECD-3249, Aug. 24, 1951, 32 pages.

Like U, Th forms no compounds with Cr, a few with Mn, the number increasing through Ni, and decreasing sharply with Cu. Structures of the compounds of Th with Mn. Data are tabulated. Diagrams. (M24, Th, Mn)

66-M. Sigma Phase in Vanadium-Nickel Alloys. W. B. Pearson and J. W. Christian. *Nature,* v. 169, Jan. 12, 1952, p. 70-71.

An X-ray examination was made of a V-Ni sigmaphase single crystal containing 60 at. % V. Results are in agreement with those of previous workers for the Fe-Cr and the Co-Cr sigma phase. V-Ni alloys have the advantage, however, that when Cr radiation is used, there is an appreciable difference in the X-ray scattering power of the V and Ni atoms. (M26, V, Ni)

67-M. Concerning the First Images Obtained With a Proton Microscope. (In French.) Paul Chanson and Claude Magnan. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v., 233, Dec. 3, 1951, p. 1436-1438.

The proton microscope and some of the first results obtained by its use. 11 ref. (M23)

68-M. Methods and Application of Electron Diffraction in Industrial Research. (In German.) Adrian Stahl. *Zeitschrift für angewandte Physik,* v. 3, Sept. 1951, p. 349-360; Oct. 1951, p. 382-396.

Reviews the literature. The theoretical basis, apparatus used, and the testing of materials. 552 ref. (M22, S general)

69-M. The Luminous Screen as Aid in X-Ray Investigation of Fine Structures. (In German.) Johann Christian Lankes, Erika Orlamünder, and Gunter Wassermann. *Zeitschrift für Metallkunde,* v. 42, Oct. 1951, p. 300-301.

Use of the above for direct observation of metal-crystal interferences in rotating and Laue pictures. (M22)

70-M. Crystal Structure of $NiMg_2$, $CuMg_2$, and $AuMg_3$. (In German.) Konrad Schubert and Kurt Anderko. *Zeitschrift für Metallkunde,* v. 42, Nov. 1951, p. 321-325.

Crystal structure was investigated. Data are tabulated. Unit-cell arrangements are shown diagrammatically. 16 ref. (M26, Ni, Mg, Cu, Au)

71-M. The Ternary System Copper-Nickel-Magnesium. (In German.) Werner Köster. *Zeitschrift für Metallkunde,* v. 42, Nov. 1951, p. 326-327.

Determination of the system by thermal analysis and structural observations. (M24, Cu, Ni, Mg)

72-M. The Structure of Manganese-Copper-Nickel Alloys With High Manganese Content. (In German.) Ulrich Zwicker. *Zeitschrift für Metallkunde,* v. 42, Nov. 1951, p. 331-335.

Various methods for investigating the above ternary system with low Cu content. Structures and phase limits of the system. Measurements of ductility and hardness. 10 ref. (M24, Q23, Q29, Mn)

73-M. Electron Microscope and Diffraction Studies of Metallic Smoke. (In English.) Riitsu Takagi. *Journal of Mechanical Laboratory,* v. 5, July 1951, p. 107-110.

Many fringes called "extinction contours" in the electron-microscope images of Al thin sections prepared by an electrolytic method were observed and explained by variation of thickness and distortion of the crystals. Many similar characteristic fringes were observed in electron-microscope images of thin-plate crystals of MoO_3. (M21, M22, Al, Mo)

74-M. Relations Between Structure and Mechanical Properties of the Bicycle Chain's Outer Links. (In Japanese.) Kunio Futaki. *Journal of Mechanical Laboratory,* v. 5, Aug. 1951, p. 135-139.

An attempt was made to determine the relation between ASTM grain size by McQuaid-Ehn test and mechanical properties such as strength and hardness of bicycle chain's outer links after final heat treatment; also the relation between structure after the final quench and temper, and load-elongation curve of the chains. It was found that the gradient of the load-elongation curve is influenced by growth of granular cementite. A direct relation between ASTM grain size by the McQuaid-Ehn test and microstructures of the outer links after heat treatment was not found, but the relation of the ASTM grain size to ferrite and pearlite grain size resulting from normalizing was determined. (M27, ST)

75-M. Preparation of Mo_3Ge and Determination of Its Structure. Alan W. Searcy, Robert J. Peavler, and H. J. Yearian. *Journal of the American Chemical Society,* v. 74, Jan. 20, 1952, p. 566-567.

The alloy was prepared by heating mixtures of Mo and Ge powders for several hours at 1000° C. Crystal structure and cell dimensions were determined by X-ray diffraction. (M26, Mo, Ge)

76-M. A Technique for Preparing Beta-Ray Autoradiographs of Metals and Minerals. A. B. Michael, W. Z. Leavitt, M. B. Bever, and H. R. Spedden. *Journal of Applied Physics,* v. 22, Dec. 1951, p. 1403-1406.

Limitations of this technique for microstructural investigations and possible variations. Illustrative examples of autoradiographs are interpreted. 18 ref. (M23)

77-M. Atomic Size Effect in the X-Ray Scattering by Alloys. B. E. Warren, and B. L. Averback and B. W. Roberts. *Journal of Applied Physics,* v. 22, Dec. 1951, p. 1493-1496.

If there are appreciable differences in both size and scattering power of two atoms, the size effect can produce modulations in the diffuse intensity which are comparable in size to those produced by short-range order. (M25)

78-M. Electron Diffraction Study on the Ordered Alloy Au_3Cu. S. Ogawa and D. Watanabe. *Journal of Applied Physics,* v. 22, Dec. 1951, p. 1502.

Results are compared with those of previous investigators. (M26, M22, Au)

79-M. The Solid Solutions of Zinc in Aluminium. E. C. Ellwood. *Journal of the Institute of Metals,* v. 80, Jan. 1952, p. 217-224.

The lattice spacings of the solid solutions of Zn in Al were determined at room and elevated temperatures up to the solidus. The phase boundaries of the solid solutions, including the solidus, were determined from the X-ray results and agree well with the published diagram. At room temperature the lattice spacings show that the apparent atomic diameter of Al increases in two separate steps as Zn is added, and it is suggested that these increases are associated with the filling of Brillouin zones. 21 ref. (M24, M26, Zn, Al)

80-M. Vanadium-Oxygen Solid Solutions. A. U. Seybolt and H. T. Sumsion. *Journal of Metals,* v. 4, Feb. 1952, p. 145.

Reports on an investigation of the V-rich portion of the V-O_2 phase diagram undertaken as part of a study of the effects of gaseous impurities on the properties of pure V. Results indicate occurrence of an order-disorder transition similar to that for Cu-Au and Co-Pt alloys. (M24, N10, V)

81-M. Orientation Relationships in Cast Germanium. W. C. Ellis and Jacqueline Fageant. *Journal of Metals,* v. 4, Feb. 1952, p. 149.

Examined microscopically and by X-ray diffraction. Micrographs. (M27, M26, Ge)

82-M. One and Two Dimensional Sections of Three Dimensional Structures. C. S. Smith and L. Guttman. *Journal of Metals,* v. 4, Feb. 1952, p. 150.

By a simple linear intercept counting method involving no assumptions as to actual shape or distribution of grain boundaries, it is possible to determine accurately the amount of grain-boundary surface in any specimen. (M27)

83-M. General Aspects of Metallic Binary Phase Diagrams. R. A. Oriani. *Journal of Metals,* v. 4, Feb. 1952, p. 151.

Correlation of general features with atomic properties. (M24)

84-M. The Influence of Solute Atoms on Crystallographic Texture and Creep Properties. C. L. Corey. *Journal of Metals,* v. 4, Feb. 1952, p. 152.

X-Ray integrated intensity measurements were made to determine mosaic block sizes of a base alloy of nominally 20% Cr, 20% Ni, 20% Co, 40% Fe and various modifications made by adding individually Mo, W, or Cb. Creep tests were conducted at 1200 and 1500° F. (M26, Q3, AY)

85-M. Twinning in Silicon. E. I. Salkovitz and F. W. von Batchelder. *Journal of Metals,* v. 4, Feb. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, p. 165.

Results of an investigation on twinning produced during slow cooling. Micrographs. (M27, Si)

86-M. Diffraction Patterns and Crystal Structure of Si_3N_4 and Ge_3N_4. W. C. Leslie, K. G. Carroll, and R. M. Fisher. *Journal of Metals,* v. 4, Feb. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 204-206.

A nitride, believed to be Si_3N_4 was separated from three nitrided silicon steels. Ge_3N_4 was prepared from pure Ge. Comparison of the diffraction patterns indicates that the two nitrides are isomorphous; an orthorhombic structure is suggested in place of the rhombohedral structure previously reported for Ge_3N_4. Micrographs. (M26, Si, Ge)

87-M. Effect of Temperature on the Lattice Parameters of Magnesium Alloys. R. S. Busk. *Journal of Metals,* v. 4, Feb. 1952; *Transactions of American Institute of Mining and Metal-*

lurgical Engineers, v. 194, 1952, p. 207-209.

A series of eight alloys, consisting of pure Mg, Mg + Ag, Mg + Al and Mg+ Sn were studied. Data are graphed and tabulated. (M26, Mg)

88-M. Observations on the Occurrence of Ti_2X Phases. W. Rostoker. *Journal of Metals,* v. 4, Feb. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 209-210.

The following alloys were prepared: Ti_2Cu, Ti_4Cu_2O, Ti_2Ni, Ti_4Ni_2O, Ti_2Co, Ti_4Co_2O, Ti_2Mn, and Ti_4Mn_2O. A summary of structures and lattice parameters of the phases found is given. (M26, Ti)

89-M. Crystal Structure of Ti_3Sn. Paul Pietrokowsky. *Journal of Metals,* v. 4, Feb. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 211-212.

Results of an investigation. Data are tabulated. 11 ref. (M26, Ti, Sn)

90-M. Observations on the Lattice Parameters of the Alpha Solid Solution in the Titanium-Aluminum System. W. Rostoker. *Journal of Metals,* v. 4, Feb. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 212-213.

Results on the above investigation are presented graphically. (M26, Ti, Al)

91-M. Cathodic Etcher. *Metal Industry,* v. 80, Jan. 18, 1952, p. 53.

New metallographic technique for studying grain structure. The sample is subjected to glow discharge under vacuum. (M23)

92-M. Grain Size of Rolled and Annealed Aluminum Alloys; Effect of Rate of Heating. J. Herenguel and F. Santini. *Metal Treatment and Drop Forging,* v. 19, Jan. 1952, p. 15-19, 26.

Influence of the rate of heating, exemplified by salt bath and air furnace treatment of 99.5% Al and Al alloys of the D. T. D. 346 or HS-10 type. Resulting mechanical properties. Micrographs. (M27, Q general, Al)

93-M. Diffraction of X-rays at Small Angles by Cold Worked Metals. (In French.) Jean Blin and André Guinier. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 233, Nov. 19, 1951, p. 1288-1290.

In a metal submitted to strong cold working, submicroscopic cavities are present, the number of which can be estimated from the X-ray diffraction pattern. Most of the experiments were conducted on high-purity Cu, cast under vacuum, and reduced by cold rolling to 10-90% of the original dimensions. (M22, Q24, Cu)

94-M. Demountable X-Ray Tube for Radiocrystallographic Studies. (In French.) Ch. Legrand. *Journal des Recherches du Centre National de la Recherche Scientifique,* no. 16, 1951, p. 31-34.

A new tube which makes possible easy and exact adjustments as well as fine focusing. Diagrams and photograph. (M21)

95-M. X-Ray Examination of Two Gold Plates From Archaelogical Excavations. (In French.) A. R. Weill. *Metallurgia Italiana,* v. 43, Dec. 1951, p. 507-511.

Nondestructive investigation of plates found at Kertsch and preserved in the Louvre. Measurement of density was followed by X-ray diffraction study of crystal structure. Composition and method of fabrication were deduced from the results. (M22, M26, P10, Au)

96-M. Contribution of X-Rays to Study of the Mechanism of Plasticity of Metals. (In French.) A. Guinier. *Métaux: Corrosion Industries,* v. 26, Nov. 1951, p. 427-432.

Use of X-rays for quantitative study of plastic deformations, orientation of crystallites in deformed metal, polycrystalline metals, and locating structural defects. Diagrams and photomicrographs. 18 ref. (M22, Q24, S13)

97-M. Ion Exchangers as Aids in the Laboratory. (In German.) G. Dickel and K. Titzmann. *Angewandte Chemie,* v. 63, Oct. 7, 1951, p. 450-457.

Possible uses (especially of synthetic-resin exchangers), discussing specifically the chemical and physical structure of exchangers, principles of action, equilibriums, and rate of exchange, also a mathematical method of determining separation in exchanger columns. Numerous practical examples supplement the discussion. Data are charted. 68 ref. (M23)

98-M. The Palladium-Cadmium System. (In German.) H. Nowotny, A. Stempfl, and H. Bittner. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften,* v. 82, Dec. 15, 1951, p. 949-958.

Study of phase equilibria with the aid of microscopic, X-ray, and magnetic methods. Tables, graphs, photomicrographs, and references. (M24, Pd, Cd)

99-M. The Palladium-Zinc System. (In German.) H. Nowotny, E. Bauer, and A. Stempfl. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften,* v. 82, Dec. 15, 1951, p. 1086-1093.

X-ray, microscopic, thermo-analytical, and magnetic study. Graphs,

tables, photomicrographs, and references. (M24, Pd, Zn)

100-M. Note on Magnesium Telluride. (In German.) W. Klemm and K. Wahl. *Zeitschrift für anorganische und allgemeine Chemie,* v. 266, Nov. 1951, p. 289-292.

Preparation and structure. Tabular data and apparatus diagram. 10 ref. (M26, Mg, Te)

101-M. Crystal Structure of GeTe. (In German.) Konrad Schubert and Horst Fricke. *Zeitschrift für Naturforschung,* v. 6a, Dec. 1951, p. 781-782.

The lattice constants of the GeTe intermediate phase in Ge-Te alloys. 11 ref. (M26, Ge, Te)

102-M. Metallography of "Xanthal B Type" (Cu-Al-Fe-Ni) Bronze. (In Italian.) A. Gragnani. *Alluminio,* v. 20, Nov. 1951, p. 423-439.

Comprehensive study of structure, transformations, and quenching and tempering relationships for alloy containing 81% Cu, 11% Al, 4% Fe, 4% Ni. Recommended tempering conditions. Graphs, phase diagrams, and photomicrographs. 18 ref. (M27, M24, J26, Cu)

103-M. Contribution to the Study of the Morphology of Nonmetallic Inclusions in Iron and Steel Products—Inclusions in Ferrotungsten. (In Italian.) R. Zoja and M. T. Gottardi. *Metallurgia Italiana,* v. 43, Dec. 1951, p. 526-529.

89 specimens taken from 29 different stocks were examined and a list of the most characteristic inclusions is given for ferrotungsten. Inclusions differ from those in ferrochromium. Photomicrographs and tables. (M28, Fe-n)

104-M. The Question of the Structure of the Emission Component of Kubetskii Tubes. (In Russian.) S. M. Fainshtein and L. I. Tatarinova. *Doklady Akademii Nauk SSSR,* new ser., v. 79, July 21, 1951, p. 435-438.

The crystallographic structure and the mechanisms of forming the surface layers of electron emitters were studied for the system Cu-S-Cs. Data are tabulated. (M26)

105-M. The Relationship Between Lattices of the NiAs and Ni_2In Type and Certain Rhombic Crystals. (In Russian.) I. I. Kripiakevich. *Doklady Akademii Nauk SSSR,* new ser., v. 79, July 21, 1951, p. 439-442.

The lattice constants of the above systems were compared. Results are tabulated. 14 ref. (M26, Ni, As, In)

106-M. Saturation of the Surface Layers of Steel With Cerium. (In Russian.) N. T. Gudtsov and G. N. Dubinin. *Izvestiia Akademii Nauk SSSR,* Section of Technical Sciences, Apr. 1951, p. 565-575.

The surfaces of steels containing 0.03-1.18% C were treated with Ce at 1000 and 1100° C. for different periods of time. Microscopic and X-ray studies were made of the surface layers. Purpose was to determine the Fe-Ce equilibrium diagram. Results are tabulated and charted. (M24, ST, Fe, Ce)

107-M. Diffraction Methods in the Metallurgical Industry. (In Spanish.) F. R. Morral. *Nucleo,* v. 6, Oct. 1951, p. 10-14.

Methods and apparatus. Results are tabulated and discussed. (M22)

108-M. A Technique for Making Strain-Free Replicas for Electron Metallography. William L. Grube and Stanley R. Rouze. *ASTM Bulletin,* Jan. 1952, p. 71-73.

An investigation to develop a satisfactory procedure which does not subject Formvar to undue stress and which will result in a strain-free replica. (M21)

109-M. Nodules and Nuclei in Nodular Iron. J. E. Rehder. *American Foundryman,* v. 21, Feb. 1952, p. 44-48.

Work on the metallography and constitution of nodular-iron graphite at the Canadian Department of Mines & Technical Surveys. Numerous photomicrographs of nodules and nuclei illustrate details seen through optical and electron microscopes. (M27, CI)

110-M. Graphical Indexing of Powder Patterns of Cubic Substances and the Choice of Radiation For Precision Measurements of Lattice Parameters. M. E. Straumanis. *American Mineralogist,* v. 37, Jan.-Feb. 1952, p. 48-52.

A convenient graphical method showing how to find the most suitable X-radiation for precision determination of lattice parameters, and at the same time, index the powder patterns. It is based on application of the three-dimensional reciprocal lattice and is very simple, especially in the case of cubic crystals. (M26)

111-M. Preferred Grain Orientation in Steel Castings. J. D. Lavender and J. I. Morley. *Journal of the Iron and Steel Institute,* v. 170, Jan. 1952, p. 26-28.

Considered in relation to the allotropic transformations that occur during cooling. Where these transformations occur at very high temperatures, of the order of 1300° C., as in certain stainless steels, the crystallographic orientation of the primary dendrites is preserved at room temperature, and columnar-grained castings will then be subject to elastic anisotropy. Where they occur at 700° C. and below, as in mild steel, a random orientation

is developed during recrystallization, and a test on a columnar-grained specimen of mild steel suggests that such castings will be elastically isotropic. (M27, N12, ST)

112-M. A Microscopical Examination of Iron Containing Manganous Inclusions. R. E. Lismer and F. B. Pickering. *Journal of the Iron and Steel Institute,* v. 170, Jan. 1952, p. 48-50.

Samples of three ingots containing inclusions of varied MnO content were examined under normal vertical illumination, under polarized light, after application of Whiteley's tests, and after acid tests. Optical and chemical characteristics of the inclusions were determined. (M27, Fe)

113-M. Ferrite-Grain-Size Measurements for Ship Plate Steel. J. E. Campbell, R. H. Frazier, and H. O. McIntire. *Welding Journal,* v. 31, Feb. 1952, p. 78s-90s; disc. 90s-94s.

Ferrite grain sizes were determined in Class A ship plate in the as-rolled condition and after austenitizing at various temperatures followed by cooling at various rates. Results obtained using intercept methods, grain counting, comparison with a special series of photomicrographs, and a fracture method for rating ferrite grain sizes were compared. Micrographs. 10 ref. (M27, CN)

114-M. Influence of Carbon on the Lattice Parameter of Molybdenum. Rudolph Speiser, J. W. Spretnak, W. E. Few, and R. M. Parke. *Journal of Metals,* v. 4, Mar. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 275-277.

Investigation was undertaken because of the known fact that interstitial carbon may cause intergranular brittleness in Mo. Various heat treatments, C analyses, and X-ray measurements were conducted. Results show that C dissolves interstitially in Mo resulting in linear expansion of lattice parameter with increase of C in solid solution. Geometrical consideration of the relationship of C-atom size to size of interstice approximately predicts the observed volume expansion. 12 ref. (M26, Q23, Mo)

115-M. Zirconium-Chromium Phase Diagram. E. T. Hayes, A. H. Roberson, and M. H. Davies. *Journal of Metals,* v. 4, Mar. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 304-306.

Details of a cooperative project between the Bureau of Mines and Air Material Command. The Zr-Cr system was investigated in the range 0-53% Cr to determine possibilities of improving corrosion resistance and mechanical properties of Zr in a manner similar to the enhancement of the properties of Ti by additions of Cr. Phase diagrams and photomicrographs. (M24, Zr, Cr)

116-M. Crystal Chemical Studies of the 5f-Series of Elements. XV. The Crystal Structure of Plutonium Sesquicarbide. XVI. Identification and Crystal Structure of Protactinium Metal and of Protactinium Monoxide. (In English). W. H. Zachariasen. *Acta Crystallographica,* v. 5, Jan. 1952, p. 17-21.

Interpretation of diffraction data. (M26, C-n, Pa, Pl)

117-M. The Structure of an α/β Brass. (In English.) R. J. Davis, R. Pearce and W. Hume-Rothery. *Acta Crystallographica,* v. 5, Jan. 1952, p. 36-38.

A detailed examination of the structure of an α/β brass. In the annealed state, ordinary etching methods reveal small angular crystals of the α phase embedded in large crystals of β. Careful electrolytic polishing and etching show that the large β crystals are in reality colonies of much smaller grains. The effect of annealing on the form of the α and β crystals, and reasons for the formation of the β substructure. Micrographs. (M26, Cu)

118-M. The Structure of Alloys of Lead and Thallium. (In English.) You-Chi Tang and Linus Pauling. *Acta Crystallographica,* v. 5, Jan. 1952, p. 39-44.

Alloys of Pb and Tl have a structure based upon cubic closest packing from 0 to about 87.5 at. % Tl. Variation of the lattice constant with composition gives strong indication that ordered structures $PbTl_3$ and $PbTl_7$ exist. A theory of the structure of the alloys is presented. 12 ref. (M26, Pb, Tl)

119-M. The Structure of $TiBe_{12}$. (In English.) R. F. Raeuchle and R. E. Rundle. *Acta Crystallographica,* v. 5, Jan. 1952, p. 85-93.

Results of an investigation. The structure seems to involve a not quite fully ordered superlattice, and it seems possible that the nature of the disorder may yet become understandable. (M26, N10, Be, Ti)

120-M. Using Chlorinated Rubber as a Film Support for Samples in Electron Microscopy. (In French.) Francois Davoine and Emile Pernoux. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 233, Dec. 19, 1951, p. 1590-1591.

Two techniques and the satisfactory results obtained. (M21)

121-M. Chemical Polishing of Iron and Soft Steel. (In French.) Louis Beaujard. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Jan. 21, 1952, p. 440-442.

A solution suitable for chemical polishing of soft steels containing less than 0.05% C. It consists of 30 parts HNO_3, 70 parts HF, and 300 parts water. Temperature recommended is 60° C. Includes photomicrograph and diagram. (M21, Fe, ST)

122-M. The Structure of $AlAu_4$. (In Russian.) V. G. Kuznetsov and V. I. Rabezova. *Doklady Akademii Nauk SSSR,* new ser., v. 81, Nov. 1, 1951, p. 51-54.

X-ray and microscopic studies were made of Au-Al alloys containing 96.75 and 96.65 wt. % Au. Data are tabulated and charted. (M26, Al, Au)

123-M. Structure of Sputtered Silver Films. C. E. Ells and G. D. Scott. *Journal of Applied Physics,* v. 23, Jan. 1952, p. 31-34.

Films were studied with the electron microscope, and their structure and physical properties correlated with data available for evaporated films. A possible explanation for the results is proposed. 18 ref. (M27, L25, P general, Ag)

124-M. Electron Diffraction Evidence for the Existence of Microstress in Evaporated Metal Films. Eber K. Halteman. *Journal of Applied Physics,* v. 23, Jan. 1952, p. 150-151.

Line broadening in electron-diffraction powder patterns from evaporated Ni films was investigated. The pure diffraction broadening was found to vary with Bragg angle in agreement with a microstress theory of broadening rather than with a particle-size mechanism. The Fourier transform of pure diffraction broadening was determined and also found to be in agreement with a microstress mechanism. (M22, L25, Q25, Ni)

125-M. Direct Printing of Shadowed Electron Micrographs. R. M. Fisher. *Journal of Applied Physics,* v. 23, Jan. 1952, p. 153-154.

Technique which has been applied in metallography of steel. (M21)

126-M. The X-Ray Diffraction Study of Single Crystals of Lead. Y. C. Chuang. *Metallurgia,* v. 45, Feb. 1952, p. 99-101.

A method by which lead single crystals can be produced. The orientation of the crystal was determined by the back-reflection Laue method. (M26, Pb)

127-M. Survey of the Chromium-Cobalt-Nickel Phase Diagram at 1200° C. W. D. Manly and Paul A. Beck. *National Advisory Committee for Aeronautics,* Technical Note 2602, Feb. 1952, 45 pages.

Microscopic and X-ray diffraction studies on 110 vacuum-melted alloys prepared from commercial metals of the highest purity available. Tables, graphs, and micrographs. (M24, Cr, Co, Ni)

128-M. Survey of Portions of the Cobalt-Chromium-Iron-Nickel Quaternary System. E. L. Kamen and Paul A. Beck. *National Advisory Committee for Aeronautics,* Technical Note 2603, Feb. 1952, 62 pages.

An isothermal survey. The Fe content was varied up to 30% to include the range of commercial Cr-Co-Ni alloys. Tables, graphs, and micrographs. 14 ref. (M24, Co, Cr, Fe, Ni)

129-M. Solubility of Magnesium in Lithium. J. A. Catterall. *Nature,* v. 169, Feb. 23, 1952, p. 336.

The phase diagram of Mg in Li has been well established except for the solid solubility of Mg in Li. Presents a diagram establishing this boundary by microscopical examination of alloys annealed and quenched at various temperatures. (M24, Mg, Li)

130-M. Ferrite Determination in Austenitic Stainless Steel. (In Dutch.) K. K. Zwart. *Smit Mededelingen,* v. 6, Oct.-Dec. 1951, p. 119-121.

The magnetic properties of an austenitic stainless steel depend on the amount of ferrite in it. Thus, the percentage of ferrite in such a steel can be ascertained by magnetic measurements. An apparatus for performing such measurements, consisting of a balance and an a.c. excited magnet. (M23, P16, SS)

131-M. Nitriding of Columbium. (In French.) Albert Septier, Maurice Gauzit, and Pierre Baruch. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Jan. 2, 1952, p. 105-107.

A columbium nitride wire was studied under the electron microscope, and probable existence of a subnitride discussed. The new method of observation increases the possibilities of using the emission microscope in metallography. Method of preparation of the wire. Micrographs. (M27, Cb)

132-M. Heat-Resistant Cast Steel. (In German.) H. Lüling. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 18, Jan. 1952, p. 22-32.

Results of experiments on effect of carbon, various alloying elements,

and heat treatment on structure and mechanical properties. Macrographs, micrographs, photographs, tables, and graphs. 22 ref.
(M27, Q general, Cl, SG-b)

133-M. Remarks on the Existence of Molybdenum Carbide. (In German.) H. Nowotny and R. Kieffer. *Zeitschrift fur anorganische und allgemeine Chemie,* v. 267, Jan. 1952, p. 261-264.

Investigation of C-rich Mo carbides reveals, not the cubic phase-centered Mo_2C, but a phase that corresponds more to MoC with slight carbon deficiency. 11 ref.
(M26, Mo, C-n)

134-M. Research on Cobalt-Beryllium Alloys. (In Italian.) G. Venturello and A. Burdese. *Alluminio,* v. 20, Dec. 1951, p. 558-564.

The Co-Be system was studied by X-ray, micrographic, and thermal-analysis methods. Two intermetallic compounds were found; Co-Be and Co_5Be_{21}, both cubic. Effects of heat treatment on alloys containing 1.56, 1.87, and 2.10% Be. Data are tabulated and charted. Micrographs and radiation patterns. 10 ref.
(M24, Co, Be)

135-M. Submicroscopic Structure of "Magnico" Alloy. (In Russian.) N. N. Buinov and V. V. Kliushin. *Doklady Akademii Nauk SSSR,* new ser., v. 80, Oct. 11, 1951, p. 739-742.

An alloy containing 50% Fe, 24% Co, 14% Ni, 9% Al, and 3% Cu was investigated. Replicas for electron microscopy were made by an oxidation method and by a single-step quartz method. Includes micrographs at 7000, 21,000, and 51,000.
(M27, M21, Fe, SG-n)

136-M. A Method of Representing Quintuple and More Complex Metallic Systems. (In Russian.) I. I. Kornilov. *Doklady Akademii Nauk SSSR,* new ser., v. 81, Nov. 11, 1951, p. 191-194.

A system for the graphical representation of equilibria in specific regions of complex metallic systems was developed. Examples are illustrated and explained. (M24)

137-M. New Intermetallic Compounds in the Fe-Mo Binary System. (In Russian.) R. P. Zaletaeva, N. F. Lashko, M. D. Nesterova, and S. A. Iuganova. *Doklady Akademii Nauk SSSR,* new ser., v. 81, Nov. 21, 1951, p. 415-416.

A new compound was found in a molybdenum steel (0.1% C, 16% Cr, 25% Ni, 6% Mo). X-rays showed this compound to be Fe_2Mo. Its structure was the same as previously observed for Fe_2W. Data are tabulated.
(M24, M26, Fe, Mo)

138-M. Solid Solutions of Metallic Compounds. (In Russian.) I. I. Kornilov. *Doklady Akademii Nauk SSSR,* new ser, v. 81, Dec 1, 1951, p. 597-600.

Types of intermetallic compounds and conditions of forming solid solutions among these compounds. Numerous examples. 13 ref. (M26)

139-M. The Ni-Si Constitution Diagram. (In Russian.) N. F. Lashko. *Doklady Akademii Nauk SSSR,* new ser., v. 81, Dec. 1., 1951, p. 605-607.

Microstructure and lattice dimensions of Ni-Si alloys containing 2, 4, and 7% Si were studied. Results are tabulated and illustrated.
(M24, Ni)

140-M. The Distribution of Electrons Round Impurities in Monovalent Metals. J. Friedel. *Philosophical Magazine,* ser. 7, v. 43, Feb. 1952, p. 153-189.

Results of theoretical investigation. Applications are made to dissolved H_2, where the impurity is a proton, and to atoms such as Zn, Ga, etc., which are usually considered to contribute their electrons to the conduction electrons. A detailed discussion is given of X-ray emission and absorption, the vacancy left in the X-ray shell being treated as the positive impurity. In certain cases quantitative predictions are made about the energies of X-ray absorption edges. 55 ref. (M25)

141-M. The Structure of the ζ Phase in the Silver-Zinc System. (In English.) I. G. Edmunds and M. M. Qurashi. *Acta Crystallographica,* v. 4, Sept. 1951, p. 417-425.

Structure for 50 at.% Ag was determined from X-ray powder photographs, using a modified form of the method of steepest descents. Results are comprehensively presented, using tables and graphs.
(M26, Ag, Zn)

142-M. The Crystal Structure of the β-Phase of Uranium. (In English.) Charles W. Tucker, Jr. *Acta Crystallographica,* v. 4, Sept. 1951, p. 425-431.

Deduced from X-ray diffraction measurements made on single crystals of the phase retained in an alloy containing 1.4 at. % Cr and rapidly cooled from 720° C. The low symmetry and complexity of the structure accounts for the rather hard, brittle nature of the phase. Inter-relations between the α, β and γ phases of the metal are clear from the β-phase crystal structure, but the precise mechanism of the transformations has not yet been studied. 10 ref. (M26, U)

143-M. Diffraction of X-Rays by Structures in Disordered Layers. I. (In French.) G. W. Brindley and J. Mering. *Acta Crystallographica,* v. 4, Sept. 1951, p. 441-447.

While the approximations in the theoretical treatments of X-ray diffraction by two-dimensional gratings are in many cases valid and justify application of the resultant formulas (in particular the Laue-Warren formulas) to the interpretation of experimental data, in certain cases a more detailed treatment is required. Concerned with variation of the structure factor within the zone of integration involved in determining the reflected intensity from a random powder of two-dimensional gratings. Application of the formulas derived. 12 ref. (M22)

144-M. Diffraction Effects in X-Ray Fourier Syntheses Due to Non-Observed "Weak Reflexions". (In English.) Arne Magnéli. *Acta Crystallographica,* v. 4, Sept. 1951, p. 447-450.

A crystal structure in which displacements of certain atoms suddenly occur at long, regular intervals gives strong X-ray reflections only in the close vicinity of reciprocal-lattice points, corresponding to the period of the basic sublattice. If the remaining reflections, which may be very weak, are not detectable by the experimental method applied, then larger diffraction effects can appear in the Fourier calculations of the electron-density function based on the observed X-ray data. (M22)

145-M. Optical Methods in X-Ray Analysis. II. Fourier Transforms and Crystal-Structure Determination. (In English.) H. Lipson and C. A. Taylor. *Acta Crystallographica,* v. 4, Sept. 1951, p. 458-462.

The optical apparatus described in Part I can be used to determine experimentally the Fourier transforms of two-dimensional projections of atomic arrangements. Methods of using these transforms to determine crystal structures; and examples of their application to certain known structures. Ways of extending this process of direct crystal-structure determination. 16 ref. (M26)

146-M. The Structure of NiSi. (In English.) Karel Toman. *Acta Crystallographica,* v. 4, Sept. 1951, p. 462-464.

The structure was determined from Weissenberg and rotating-crystal photographs using CuKα radiation. Dimensions of the unit cell were determined by the powder method. (M26, Ni, Si)

147-M. Twinning and Slip in α-Uranium. (In English.) R. W. Cahn. *Acta Crystallographica,* v. 4, Sept. 1951, p. 470-471.

A study was made of the crystallographic elements of twinning and slip in the orthorhombic (low-temperature) form of uranium. The experiments were carried out with coarse-grained metal made by recrystallization after small extensions. A special precision back-reflection X-ray camera was used, by means of which it was possible to obtain Laue patterns from grains previously selected under a polarizing microscope. (M27, Q24, U)

148-M. Semi-Microradiography and Its Application to Aluminum Alloys. (In French.) Mladen Paic. *Revue de Métallurgie,* v. 49, Jan. 1952, p. 51-59.

Theoretical principles and the technique of "semi-microradiography", as well as possibilities of the study of light alloys with respect to distribution of the components in cast Al alloys. Includes sketches and "semi-microradiographs". 28 ref. (M23, Al)

149-M. Observations on Drastically Quenched Iron-Carbon Melts. (In German.) Günter Falkenhagen and Wilhelm Hofmann. *Archiv für das Eisenhüttenwesen,* v. 23, Jan.-Feb. 1952, p. 73-74.

Brief discussion of X-ray and metallographic studies is illustrated by an X-ray diagram, photomicrographs, and tabular data. 11 ref. (M21, M22, N8, Fe, ST)

150-M. The Electron Microscope in Metallurgy. (In German.) Hans Mahl. *Metall,* v. 6, Feb. 1952, p. 69-73.

Principal electron microscopic methods of studying the surfaces of metals. Electron micrographs and diagrams. 25 ref. (M21)

151-M. Investigation of Aluminum-Titanium Alloys With High Titanium Content. W. Gruhl. (In German.) *Metall,* v. 6, Mar. 1952, p. 134-135.

The microscopic and radiographic investigation of a number of Al-Ti alloys with a Ti content of 50-80%. Results concerning the γ phase and the α solid solution. Micrographs. (M27. Al, Ti)

152-M. On the Platinum-Zinc and Platinum-Cadmium Systems. (In German.) H. Nowotny, E. Bauer, A. Stempft, and H. Bittner. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften,* v. 83, Feb. 15, 1952, p. 221-236.

Metallographic, X-ray, magnetic, and thermo-analytical methods were used to establish the phases of above alloys. Zn and Cd were found to be very soluble in Pt. Data graphed and tabulated. (M24, Pd, Zn, Pt, Cd)

153-M. A Method for Investigation of Quaternary Systems, Illustrated by

the Lead-Zinc-Cadmium-Tin System. (In German.) Erich Lindner. *Zeitschrift für Metallkunde,* v. 42, Dec. 1951, p. 377-387.

Representation of constitution of quaternary system by means of cuts which are parallel to two intersecting edges of a tetrahedron. Saturation limits of the separation occurring in the system while in the liquid state. Tables and graphs. (M24, Pb, Zn, Cd, Sn)

154-M. Crystal Structure of $PtPb_4$. (In German.) Ulrich Rösler and Konrad Schubert. *Zeitschrift für Metallkunde,* v. 42, Dec. 1951, p. 395-400.

On the basis of the literature and of new experiments. Data on powder patterns using Cu-Kα radiation are tabulated. Relationship of structure of $PtPb_4$ to that of other binary alloys of the $CuAl_2$ family. (M26, Pt, Pb)

155-M. An Investigation of Plasticity and Other Properties of Alloys in the Fe-Ni-Ta System. (In Russian.) K. A. Osipov. *Izvestiia Akademii Nauk SSSR,* Section of Technical Sciences, June 1951, p. 848-851.

Limits of the λ and γ solid solutions of the above system were determined by measuring electrical resistance, hardness, and a "bending" index. Data are discussed and charted. (M24, Q23, Fe, Ni, Ta)

156-M. An Experimental Investigation of the Structure of Atoms in Crystals. (In Russian.) S. T. Konobeevskii. *Uspekhi Fizicheskikh Nauk,* v. 44, May 1951, p. 21-32.

Data from X-ray studies were used to calculate the possibility of the existence of atoms as such in crystals. Aluminum and diamond crystals were investigated. Data are tabulated and charted. (M25, Al)

157-M. Electron Metallography. R. D. Heidenreich. *Bell Laboratories Record,* v. 30, Mar. 1952, p. 101-105.

Use of the electron microscope to study structures of metals. (M21)

158-M. The In—In_2S_3 System. M. F. Stubbs, J. A. Schufle, A. J. Thompson, and J. M. Duncan. *Journal of the American Chemical Society,* v. 74, Mar. 20, 1952, p. 1441-1443.

Phase diagram for the In-In_2S_3 system, obtained by thermal analysis, metallography, and X-ray studies. In_2S_3, (In_3S_4), (In_5S_6), and InS were found to exist, but not the previously reported In_2S. (M24, In)

159-M. The Constitution of the Copper-Rich Copper-Zinc-Germanium Alloys. P. Greenfield and G. V. Raynor. *Journal of the Institute of Metals,* v. 80, Mar. 1952, p. 375-384.

Results of an investigation. 20 ref. (M24, Cu, Zn, Ge)

160-M. Note on Sub-Crystal Structure in Cold-Rolled Aluminium. A. E. L. Tate and D. McLean. *Journal of the Institute of Metals,* v. 80, Mar. 1952, p. 390.

A subcrystal structure has been detected microscopically in cold rolled Al. The subcrystals are about 20 times larger linearly than those detected by X-rays. Micrographs. (M26, Q24, Al)

161-M. A New Complex Eta-Carbide. A. Taylor and K. Sachs. *Nature,* v. 169, Mar. 8, 1952, p. 411.

During a recent examination of a complex iron-free, Ni-base alloy containing Co, Cr, Mo, and W, a microconstituent, thought to be a carbide, was extracted by electrolysis. The Debye-Scherrer pattern of the extract was closely analogous to that of a sample of Fe_4W_2C, but its lattice parameter was very much lower. Chemical analysis revealed, in addition to Ni and C, the presence of appreciable amounts of Si, Cr, Co, W, Mo, and N_2. A structural formula was developed analogous to the complex high-speed steel n-carbide $Fe_3(W,Mo)_3C$ reported by Goldschmidt. (M26, TS, C-n)

162-M. Metallography. G. K. Manning. "Encyclopedia of Chemical Technology. Vol. 8" (Interscience Encyclopedia, New York), 1952, p. 923-934.

Illustrates and discusses typical metallographic structures. Various methods used in specimen preparation, and use of the microscope. (M general)

163-M. New Data on the Crystalline Structure of the β-Phase of the Na-Pb System. (In Russian.) E. S. Makarov and Z.V. Popova. *Izvestiia Akademii Nauk SSSR,* Section of Chemical Sciences, July-Aug. 1951, p. 377-387.

X-ray study of the Na-Pb system indicated that the β-phase exists within the range 26.5-35.1 at. % Na. It has a cubic structure of the Cu_3Au type. Data are tabulated and charted. (M26, M24, Na, Pb)

164-M. Study of Imperfections of Crystal Structure in Polycrystalline Materials: Low Carbon Alloy and Silicon Ferrite. J. J. Slade, Jr. and Sigmund Weissmann. *Journal of Applied Physics,* v. 23, Mar. 1952, p. 323-329.

The technique of the new X-ray double spectrometer method was applied to the study of angular misalignment of crystal structure in alloys. The specimens investigated include a low-carbon alloy annealed at 850° C. and three silicon ferrite samples annealed at 980, 1100, and

1200° C. The data show a significant dependence of crystal perfection on annealing temperature, and demonstrate clearly that angular misalignment of the coherently reflecting regions within the grains decreases with annealing temperature, provided this temperature is not excessive. Influence of cold rolling on the subsequent annealing process. A mechanism of grain bending during plastic deformation is suggested; relationship between magnetic properties, annealing temperature, and crystal perfection of silicon ferrite. (M26, J23, Q24, P16)

165-M. Lattice Parameters, Coefficients of Thermal Expansion, and Atomic Weights of Purest Silicon and Germanium. M. E. Straumanis and E. Z. Aka. *Journal of Applied Physics,* v. 23, Mar. 1952, p. 330-334.

Data are tabulated and discussed. 15 ref. (M26, P10, P11, Si, Ge)

166-M. Approximate Elastic Spectrum of β-Brass From X-Ray Scattering. H. Cole and B. E. Warren. *Journal of Applied Physics,* v. 23, Mar. 1952, p. 335-340.

The diffuse scattering of X-rays from a single crystal of β-brass was measured at room temperature using a Geiger-counter spectrometer and crystal monochromated CuKα radiation. Measurements were made throughout a large region in reciprocal space, with special attention to the *hko* plane. Results are in excellent qualitative agreement with the theory developed by Laval and James in which temperature vibrations are expressed in terms of elastic waves. 10 ref. (M23, M26, Cu)

167-M. Analysis of Certain Errors in the X-Ray Reflection Method for the Quantitative Determination of Preferred Orientations. Warren P. Chernock. *Journal of Applied Physics,* v. 23, Mar. 1952, p. 341-345.

The reflection method for quantitative determination of pole figures, proposed by Schulz, proved to be limited with respect to the range of tilting angles in which satisfactory results can be obtained. The previously unexplained decrease in the diffracted intensity with increasing tilting angle for specimens with random orientation distribution can be accounted for on the basis of an elementary analysis of defocusing effects. The importance of accurate specimen alignment, and a satisfactory alignment check procedure. (M23)

168-M. Physical Structure and Magnetic Anisotropy of Alnico 5. Parts I and II. R. D. Heidenreich and E. A. Nesbitt. *Journal of Applied Physics,* v. 23, Mar. 1952, p. 352-371.

Results of a combined electron-microscope and electron-diffraction study. The experimental work substantially confirmed the physical picture established by the Kittel, Nesbitt, and Shockley theory. A new face-centered cubic precipitate, transitory in nature, was found, which is essential in accounting for the alloy's permanent magnet properties. Numerous micrographs, diagrams, and graphs. 18 ref. (M26, P16, Al, Co, Ni, Sg-n)

169-M. A New Superlattice in Co-Pt Alloys. A. H. Geisler and D. L. Martin. *Journal of Applied Physics,* v. 23, Mar. 1952, p. 375.

Structure of an alloy containing 30% Co was investigated. It was found by X-ray diffraction analysis that this alloy formed a superlattice of the type to be expected for Pt_3Co; it is face-centered cubic with Co atoms on the corner sites and Pt atoms on the face centers analogous to Cu_3Au. Heat treatment transformations resulting in formation of this phase. (M26, N10, Co, Pt)

170-M. Joint Discussion on the Papers—The Crystal Structure of Graphite in Cast Iron, by W. S. Owen **and** B. G. Street; **The Carbide Phase in Iron-Carbon-Silicon Alloys, by** W. S. Owen. *Journal of the Iron and Steel Institute,* v. 170, Mar. 1952, p. 237-243.

Papers published in Feb. 1951 issue; item 71-M, 1951. (M26, N8, CI)

171-M. Solubility of Carbon in 18 Percent Chromium 10 Percent Nickel Austenite. Samuel J. Rosenberg and Carolyn R. Irish. *Journal of Research of the National Bureau of Standards,* v. 48, Jan. 1952, p. 40-48.

A series of high-purity Fe-Cr-Ni (18-10 base) alloys, with C ranging from 0.007 to 0.30%, was melted and solidified in vacuum. The presence or absence of carbides in these alloys after various mechanical and thermal treatments was determined by metallographic examination. (M26, AY)

172-M. Use of Etch Figures for Micrographic Investigations of Commercially Pure Aluminum and Aluminum Alloys. Jean Herenguel. *Journal of Metals,* v. 4, Apr. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 385-386.

Method and typical results. (M23, Al)

173-M. Contribution to the Metal-Carbon-Boron Systems. Frank W. Glaser. *Journal of Metals,* v. 4, Apr. 1952; *Transactions of the American*

Institute of Mining and Metallurgical Engineers, v. 194, 1952, p. 391-396.

Metal-carbon-boron powder mixtures were hot pressed and the resulting specimens studied by X-ray diffraction. It was found that, regardless of the starting composition, a metal boride phase was always the major component in these samples. Two new phases of the system Ti-B were found: Ti_2B and Ti_2B_5. The existence of a controversial face-centered cubic phase of formula TiB was confirmed. Electrical resistivities were measured for various boride phases. Tabular data. 19 ref. (M24, P15, Ti, B)

174-M. Lead-Uranium System. R. J. Teitel. *Journal of Metals,* v. 4, Apr. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 397-400.

Investigated by X-ray, thermal, and microscopic analyses. Two pyrophoric intermetallic compounds were found; UPb_3 and UPb. Crystallographic structure of UPb_3. A phase diagram was drawn for the system showing two eutectic and one synthetic reaction. Photomicrographs and tables. (M24, Pb, U)

175-M. Interpretation of a New Structure for Silicon Carbide, "SiC VII". (In Russian.) E. B. Gasilova, M. S. Beletskii, and M. I. Sokhor. *Doklady Akademii Nauk SSSR,* new ser., v. 82, Jan. 1, 1952, p. 57-60.

X-ray studies were made on powdered SiC. Data are tabulated. The existence of a 7th crystalline modification of the compound is claimed. Lattice parameters are tabulated. (M26, Si, C-n)

176-M. One Case of the Observation of Electron Diffraction From Gaseous Molecules. (In Russian.) A. I. Andrievskii and I. V. Kutovyi. *Doklady Akademii Nauk SSSR,* new ser., v. 82, Jan. 11, 1952, p. 225-228.

Conditions for obtaining the data, and examples. Data are charted for Cu_2O, CdO, and Cd_2O, on the basis of which crystal-structure parameters for Cu and Cd are tabulated. (M26, Cd, Cu)

177-M. Interpretation of the Crystal Structure of "SiC VIII". (In Russian.) E. B. Gasilova and M. I. Sokhor. *Doklady Akademii Nauk SSSR,* new ser., v. 82, Jan. 11, 1952, p. 249-251.

An X-ray study was made of SiC. Data are tabulated. An 8th type of structure is claimed to exist. (M26, Si, C-n)

178-M. Crystal Structure of the Cu_2Cd Phase. (In Russian.) P. P. Kripiakevich, E. I. Gladyshevskii, and E. E. Cherkashin. *Doklady Akademii Nauk SSSR,* new ser., v. 82, Jan. 11, 1952, p. 253-256.

X-ray data. The structure is shown to be the same as that of Zn_2Mg. 12 ref. (M26, Cu, Cd)

179-M. (Book) Practical Electron Microscopy. V. E. Cosslett. 299 pages. 1951. Academic Press, 125 E. 23rd St., New York 10, N. Y. $5.50.

An introduction to the basic physical features and to the functioning and operation of the several parts of the electron microscope. 290 ref. (M21)

180-M. Applied Research Evolves New Data on the Magnesium Zirconium System. O. A. Carson and D. T. Austin. *Canadian Mining Journal,* v. 73, Apr. 1952, p. 70-75.

Results of a thesis submitted to the Department of Metallurgy at Queen's University, Kingston, Ont. Graphs and photomicrographs. 15 ref. (M24, Mg, Zr)

181-M. Scattering of Visible and Near Infrared Radiation by Layered Distributions of Small Metal Spheres. E. Lynn Cleveland and Richard C. Raymond. *Journal of the Optical Society of America,* v. 42, Mar. 1952, p. 183-186.

Effective scattering cross sections for metal spheres were measured through the resonance region, using wave-lengths between 0.45 and 15μ. Spheres of Fe and Cu sorted into reasonably narrow diameter distributions between 2 and 20μ were supported in layers on Pliofilm and AgCl. Results are in general accord with qualitative predictions based on the Mie theory. 15 ref. (M25, Fe, Cu)

182-M. The Influence of Structure on Hardness With Special Reference to Steels. H. A. Unckel. *Metallurgia,* v. 45, Mar. 1952, p. 115-120.

Details of experimental results especially on a hypereutectoid plain carbon steel and a high-Cr die steel. Tabular data and photomicrographs. (M27, Q29, CN, TS)

183-M. X-Ray Line-Broadening From Cold Worked Iron. J. H. Auld and R. I. Garrod. *Nature,* v. 169, Apr. 5, 1952, p. 579-580.

Experiments on cold-worked Fe carried out in the Defense Research Laboratories, Melbourne. (M22, Fe)

184-M. "Paraglyph" Printing for the Reproduction of Radiographs. (In French.) H. Granjon. *Soudure et Techniques Connexes,* v. 6, Jan.-Feb. 1952, p. 42-43.

Beginning with the original negative, a positive is made on film by contact. The proofs are then placed

in contact with paper, superimposing on the printing-box the negative and the positive in slight misalignment. As a result, a relief effect is produced, equivalent to a photograph on which a radiograph is superimposed. (M23, S13)

185-M. Structure of Liquid Tin, Bismuth and Lead. (In Russian.) A. I. Donilova, V. I. Danilov, and E. Z. Spektor. *Doklady Akademii Nauk SSSR*, new ser., v. 82, Feb. 1, 1952, p. 561-564.

X-ray studies were made. The arrangements of the atoms in the liquid and solid states are compared. Data are charted. (M26, Pb, Bi, Sn)

186-M. The Crystal Structure of Electrodeposited Silver. D. N. Layton. *Electrodepositors' Technical Society*, Advance Copy 9, 1952, 6 pages.

Literature review and results of experiments. Includes diagrams, diffraction patterns, and micrographs. 17 ref. (M26, L17, Ag)

187-M. The System Aluminum-Indium-Tin. A. N. Campbell, L. B. Buchanan, J. M. Kuzmak, and R. H. Tuxworth. *Journal of the American Chemical Society*, v. 74, Apr. 20, 1952, p. 1962-1966.

Includes the complete equilibrium diagram of the binary system Al-In. For the ternary system Al-In-Sn, isotherms were established for 750, 700, 650, and 450° C. using a constant-temperature furnace and sampling and analyzing congruent solutions. Tables and diagrams. (M24, Al, In, Sn)

188-M. The Uranium-Carbon System. M. W. Mallett, A. F. Gerds, and H. R. Nelson. *Journal of the Electrochemical Society*, v. 99, May 1952, p. 197-204.

An investigation of the uranium-carbon system was made and a constitution diagram drawn on the basis of melting point, X-ray, and metallographic data. Three carbides of uranium were detected and identified: UC, U_2C_3, and UC_2. Photomicrographs. 17 ref. (M24, U, C-n)

189-M. The Constitution of the Aluminium-Chromium-Zinc Alloys at Low Chromium Contents. A. R. Harding and G. V. Raynor. *Journal of the Institute of Metals*, v. 80, Apr. 1952, p. 435-448.

The system Al-Cr-Zn was examined, by metallographic and X-ray methods, at low Cr contents. Experimental procedure and results of the investigation. Phase diagrams and charted data. 15 ref. (M24, Al, Cr, Zn)

190-M. The Aluminium-Rich Alloys of the System Aluminium-Chromium-Iron. J. N. Pratt and G. V. Raynor. *Journal of the Institute of Metals*, v. 80, Apr. 1952, p. 449-458.

The system Al-Cr-Fe was examined, in the Al-rich region, by metallographic and X-ray methods and by the chemical analysis of primary crystals extracted from slowly cooled alloys. Examination of the results shows that a strong analogy exists between the Al-rich alloys of this system and those of the system Al-Cr-Mn. The close analogies between the two structures are discussed in terms of the nature of the binary compounds. Phase diagrams and charted data. 15 ref. (M24, Al, Cr, Fe)

191-M. The Equilibrium Diagram of the System Copper-Gallium in the Region 30-100 At.-% Gallium. J. O. Betterton and William Hume-Rothery. *Journal of the Institute of Metals*, v. 80, Apr. 1952, p. 459-468.

Constitution of the Ga-rich alloys. According to previous work a phase δ, with a γ-brass structure, existed at low temperatures in the range 30-40 at. % Ga and at high temperatures underwent a transformation into a phase denoted γ, whose structure was not determined. The present work shows that this transformation is an order-disorder change, and that the high-temperature γ phase has a typical γ-brass structure. Graphs and phase diagrams. (M24, N10, Cu, Ga)

192-M. Chromium Carbide in Stainless Steel. A. B. Kinzel. *Journal of Metals*, v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 469-488.

An extensive study of $Cr_{23}C_6$ formation in AISI Type 304 stainless steel. Specimens were treated for 100 hr. at 100° intervals from 1000 to 1500° F. and for 10 selected intervals from 5 min. to 64 hr. at 1300° F. Metallographic observations were made on form and distribution of the carbides. Numerous photomicrographs. (M26, SS, Cr, C-n)

193-M. Intermediate Phases in Ternary Alloy Systems of Transition Elements. *Journal of Metals*, v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 522-523.

Discussion of paper by Sheldon Rideout, W. D. Manly, E. L. Kamen, B. S. Lement, and Paul A. Beck; item 285-M, 1951. (M24, AY)

194-M. Chromium-Nickel Phase Diagram. *Journal of Metals*, v. 4, May

1952, *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 523-524.

Discussion of paper by David S. Bloom and Nicholas J. Grant; item 303-M, 1951. (M24, Cr, Ni)

195-M. Proposed Phase Designations for Titanium-Rich Alloys. Walter L. Finlay. *Modern Metals,* v. 8, Apr. 1952, p. 69-70, 72.

Proposes system which would be consistent among all Ti-rich alloys. (M26, Ti)

196-M. Further Observations of Growth Patterns on Silicon Carbide (Si-C) Crystals. Ajit Ram Verma. *Philosophical Magazine,* ser. 7, v. 43, Apr. 1952, p. 441-446.

Further observations of growth patterns on SiC crystal faces using techniques previously described. Conditions for the interaction of growth fronts issuing from a number of dislocations, and shapes of the loci of points of their intersection are calculated. (M26, Si, C-n)

197-M. Factors Affecting the Solubility of Carbon in Iron. R. V. Riley. *Proceedings of the Institute of British Foundrymen,* v. 44, 1951, p. A81-A96; disc., p. A96-A99.

Previously abstracted from *Institute of British Foundrymen.* See item 290-M, 1951. (M24, N12, E10, CI)

198-M. The Use of Gold Leaf as a Reference Material in the Determination of Lattice Constants by Electron Diffraction. R. I. Garrod. *Proceedings of the Physical Society,* v. 65, sec. A., Apr. 1, 1952, p. 292-293.

Work applied to several types of samples. (M26)

199-M. The Crystal Parameters of Beryllium. E. A. Owen. *Proceedings of the Physical Society,* v. 65, sec. A., Apr. 1, 1952, p. 294-295.

Correlates and discusses various values reported in the literature. (M26, Be)

200-M. Austenite in Low Carbon Iron. J. W. Menter, J. Nutting, and A. L. Tsou. *Proceedings of the Physical Society,* v. 65, sec. B., Apr. 1, 1952, p. 305-306.

Grain boundaries were examined by electron diffraction. Results. (M27, Fe)

201-M. A Specimen-Treating Adaptor for the Electron Microscope. Nobuji Sasaki and Ryuzo Ueda. *Review of Scientific Instruments,* v. 23, Mar. 1952, p. 136-138.

A substance already placed on the specimen holder can be subjected to a certain physical or chemical treatment and then moved to the usual position of observation without exposing it to air, in the apparatus described. Includes photomicrographs of MoO_3 after phases of oxidation and reduction. (M21)

202-M. Microanalytical Problems in Metallography and Metallurgy. (In German.) W. Koch. *Angewandte Chemie,* v. 64, Apr. 7, 1952, p. 187-195.

Particular problems with reference to investigation of the structure of iron and steel. It has been possible to obtain new information concerning carbide and oxide inclusions, as well as those of nitrides, sulfides and intermetallic compounds. Particular attention is paid to problems of sampling. Micrographs, photographs, diffraction patterns, graphs, and diagrams. 16 ref. (M general, Fe, ST)

203-M. Electron Interferences and Their Application. (In German.) H. Raether. *Ergebnisse der exacten Naturwissenschaften,* v. 24, 1951, p. 54-141.

Electron sources and theory of electron interferences. Methods of applying them in study of mechanically worked and electropolished and electrodeposited surfaces. Diagrams, photographs, and electron micrographs. 188 ref. (M25, M21)

204-M. Investigation of Iron Amalgam for Grain Size and Ferro-Magnetism. (In German.) A. Mayer and E. Vogt. *Kolloid Zeitschrift,* v. 125, Mar. 1952, p. 174-175.

Brief discussion on colloidal solutions of Fe in Hg (amalgam). (M27, P16, Fe, Hg)

205-M. The Miscibility Gap in the Liquid Phase of the Lead-Zinc-Silver System. (In German.) W. Seith and H. Johnen. *Zeitschrift für Elektrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Feb. 1952, p. 140-143.

Thermal analysis was applied to investigation. Graphs. (M24, Pb, Zn, Ag)

206-M. The Structure of Electrolytic Alloy Deposits. VII. Copper-Bismuth and Copper-Antimony Alloys. (In German.) Ernst Raub. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 5, Apr. 1952, p. 153-160.

Deposition conditions; composition; hardness, microscopic, and X-ray analyses; structures of the deposits; and their relationships to constitution diagrams. Tables and graphs. 12 ref. (M27, M24, L17, Cu, Bi, Sb)

207-M. Attempts at an Explanation of the Lanthanum-Sodium and the

Lanthanum-Calcium Binary Systems. (In German.) Walter von Mässenhausen. *Zeitschrift für Metallkunde,* v. 43, Feb. 1952, p. 53-54.

Experiments indicate that there is only a slight affinity between La and Na or Ca. Thermal analysis seems to indicate existence of eutectic state which, however, could not be established by microscopic investigations. (M24, La, Na, Ca)

208-M. Two-Dimensional Electron Interferences in Irradiated Metal Layers. (In German.) H. Raether. *Zeitschrift für Naturforschung,* v. 7a, Feb. 1952, p. 210.

Study of crystal lattices with electron interferences requires the use of monocrystals or monocrystal-like layers. Includes schematic representation of the transmission diagram of Au-Cu layers in different irradiation directions. (M26)

209-M. The Structure of Metallic Materials. (In German.) K. Wellinger. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, Mar. 1, 1952, p. 177-184.

A review. Types of structure examinations, relationship between structure and chemical composition, and structure and type of production. Micrographs, macrographs, and diagrams. (M27, M28)

210-M. New Experimental Data on Dislocations in Metals. (In Russian.) *Uspekhi Fizicheskikh Nauk,* v. 45, Sept. 1951, p. 154-158.

A review taken from current literature, both Russian and Western. (M26)

211-M. Determination of the Orientation of Metallic Monocrystals. (In Russian.) N. B. Gornyi. *Zapiski Vsesoiuznogo Mineralogicheskogo Oshchestva,* ser. 2, v. 80, Oct.-Dec. 1951, p. 245-257.

A method using reflected light rays. Results are compared with Laue-grams. Data are tabulated. (M23)

212-M. The Use of Isoactivity Lines in Ternary Phase Diagrams. (In Swedish.) Mats Hillert. *Jernkontorets Annaler,* v. 136, No. 2, 1952, p. 25-37.

In isothermal sections of ternary phase diagrams, compositions of constant activity for each component may be represented by contour curves, called isoactivity lines. A useful general property of such lines is formulated and the value of this property demonstrated in five applications. (M24)

213-M. Structure of Oxide Replicas for Electron Microscopy. Shigeto Yamaguchi. *Journal of Applied Physics,* v. 23, Apr. 1952, p. 445-447.

Concludes that oxide films formed on metals, whose atom distances coincide with those of the substrata, can reproduce the substrate faces satisfactorily. Micrographs of oxide films on a single crystal of Fe and of an Fe-Ni alloy. (M21, Fe, Ni)

214-M. The Separation of Cold-Work Distortion and Particle Size Broadening in X-Ray Patterns. B. E. Warren and B. L. Averbach. *Journal of Applied Physics,* v. 23, Apr. 1952, p. 497.

Method based on crystallographic measurements. Graphs. (M22)

215-M. Quantitative Printing Methods for the Study of Segregation in Steel. Hugh O'Neill. *Metallurgia,* v. 45, Apr. 1952, p. 215-216.

An attempt to determine quantitatively the degree of sulfide segregation in a steel, by the photometry of transparent sulfur prints. The principle can be extended to phosphorus prints on cellophane. Mn and Cr printing should also be possible. Tables and graphs. (M28, ST)

216-M. Sigma Phase in High-Purity 18-10. Samuel J. Rosenberg and Carolyn R. Irish. *Metal Progress,* v. 61, May 1952, p. 92-93.

A study of phase boundaries of the Fe-Cr-Ni ternary diagram at 1200° F. in reference to conflicting published data. Phase diagrams and micrographs. (M24, SS, Fe, Ni, Cr)

217-M. Fine Crystals at Polished Surface. Bruce Chalmers. *Metal Progress,* v. 61, May 1952, p. 94-95.

Further evidence that mechanical polishing leaves behind a surface which, in crystallographic nature, may be far different from the metal a small distance underneath. Laue photographs of silver single crystals. (M26, M21, Ag)

218-M. Microscope for High-Temperature Metallography. *Metal Progress,* v. 61, May 1952, p. 166, 168. (Condensed from "A Simple Reflecting Microscope for High-Temperature Metallography". D. W. Dewhirst and M. J. Olney.)

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 14-M, 1952. (M21)

219-M. The Effects of Configuration Interaction on the Atomic Hyperfine Structure of Gallium. G. F. Koster. *Physical Review,* ser. 2, v. 86, Apr. 15, 1952, p. 148-154.

Theoretical and mathematical study. Determination of quadrupole moments of Ga, and estimate of those for Al, In, and Cl. Tables. 17 ref. (M26, Ga, Al, In)

220-M. Some Preliminary Comments on the System Molybdenum-Aluminum. R. L. Wachtell. *Powder Metallurgy Bulletin,* v. 6, Apr. 1952, p. 99-104.

A tentative phase diagram and photomicrographs. Powder metallurgy was found satisfactory for the preparation of alloys containing less than about 70% Al. In view of the oxidation protection of Al-Mo alloy coatings, curves are included showing the performance in air of hot pressed bodies of several compositions at 1150° C.
(M24, H general, Mo, Al)

221-M. Micrographic Study of the Brittle and Tough States of Low-Alloy Carbon Steels. (In French.) P. A. Jacquet. *Revue de Métallurgie,* v. 49, Mar. 1952, p. 195-207.

Use of a coating of cellulose acetate to clean the surface, which has been prepared by electropolishing followed by attack in an ether solution of picric acid. This improvement of the technique makes it possible to determine the structural differences between two states of the same piece of steel, obtained directly after tempering or by reversible heat treatment. Micrographs. 15 ref. (M21, AY)

222-M. Investigation of the Structure of Fused Inorganic Materials and Amorphous Substances. (In German.) J. E. Hiller. *Angewandte Chemie,* v. 64, Apr. 21, 1952, p. 209-212.

On the basis of experiments and calculations, the glasses are used as an example to show that there is also a loose form of arrangement in the amorphous stage; but that, in contrast with crystals, it lacks periodicity and thereby symmetry. Differences in distance between particles and in coordination numbers between the crystalline and the amorphous states are shown for Se, Sb, As, molten metals, water, A, and N_2. 35 ref. (M26)

223-M. (Book) **Elements of Physical Metallurgy.** Albert G. Guy. 293 pages. 1951. Addison-Wesley Press, Inc., Cambridge 42, Mass. $6.50.

A textbook for courses in fundamentals of physical metallurgy. Atomic and crystal structure; equilibrium diagrams; structure of alloys; physical properties; elasticity and plasticity of metals; corrosion; diffusion; recovery, recrystallization, and grain growth; heat treatment of steel, and a survey of metallurgy.
(M general, N general, P general)

224-M. (Book) **The Interpretation of X-Ray Diffraction Photographs.** N. M. F. Henry, H. Lipson, and W. A. Wooster. 258 pages. 1951. MacMillan and Co., London; or D. Van Nostrand Co., 250 Fourth Ave., New York 3, N. Y. $8.50.

Intended to help students and research workers to understand the theory and practice of the interpretation of X-ray diffraction photographs. The discussion is carried up to the subject of crystal-structure determination, but does not include more than passing reference to space groups and their recognition by means of X-ray diffraction. (M22)

225-M. (Book) **Le Microscope Electronique et ses Applications.** (The Electron Microscope and Its Applications.) T. Reis. 202 pages. 1951. Presses Universitaires de France, 108 Blvd. St. Germain, Paris.

Part I: Limits of vision and principles of the optics of the light; theoretical principles of electronic optics; parts of the electron microscope; commercially available types and future prospects. Part II: Preparation of specimens, and applications of the microscope in the fields of chemistry, metallurgy, and biology. (M21)

226-M. The Structure of Films of Copper Obtained by Electrodeposition on a Monocrystal of Electropolished β-Brass. (In French.) Noboru Takahashi. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Apr. 16, 1952, p. 1619-1621.

Includes electron micrographs.
(M27, L17, Cu)

227-M. The Electron Microscope and Metallography. Part II. Applications to Metallography. (In French.) A. Septier and M. Gauzit. *Métallurgie et la Construction méchanique,* v. 84, Mar. 1952, p. 241, 243, 245, 247, 249.

Use of emission, reflection, and transmission microscopes for study of surface finishes, corrosion phenomena, structural aging, and mechanical treatment and heat treatment of steels. Micrographs. (M21)

228-M. The Palladium-Mercury System. (In German.) H. Bittner and H. Nowotny. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften,* v. 83, No. 2, 1952, p. 287-289.

Preparation and properties of several Pd amalgams (11.2-34.8% Pd). Includes tabulated results of X-ray diffraction studies. (M24, Pd, Hg)

229-M. Structural Neutronography. (In Russian.) R. P. Ozerov. *Uspekhi Fizicheskikh Nauk,* v. 45, Dec. 1951, p. 481-552.

A review of the use of neutrons instead of X-rays or electron beams

for the study of the structure of matter. 76 ref. (M22)

230-M. How Can We Obtain Good Micropictures by High Scattering? Some Optical Points of View. (In Swedish.) Sten Modin and L. E. Eriksson. *Jernkontorets Annaler,* v. 136, No. 1, 1952, p. 1-8.

Five different lenses of high resolving power were investigated with respect to their performance in obtaining micrographs of metallic surfaces, both photographically and visually. The experiments were made without filters, as well as with yellow, green, and blue filters. The light transmission of several immersion oils was investigated. Tables, charts, and micrographs. (M21)

231-M. Nodules and Nuclei in Nodular Cast-Iron. Part II. (Concluded.) J. E. Rehder. *American Foundryman,* v. 21, May 1952, p. 87-90.

Size distribution, chemical analysis, and X-ray diffraction studies at Canadian Department of Mines & Technical Surveys. (M27, CI)

232-M. Electron Microstructure of Bainite in Steel. *ASTM Bulletin,* May 1952, p. 62-65. (A condensation. To be published in full in preprint of Report of ASTM Committee E-4 on Metallography.)

A study of the isothermal transformation products formed within the bainite range between 500 and 950° F. The steel used contained 0.39% Ni and 0.21% Cr. Table and electron micrographs. (M27, AY)

233-M. Optical Microscopy: an Adjunct to Engineering and Research. F. G. Foster. *Bell Laboratories Record,* v. 30, June 1952, p. 253-260.

Includes technique in metallurgical microscopy. Photographs and photomicrographs. (M21)

234-M. The Resolution of the Metallurgical Microscope. E. Wilfred Taylor. *Bulletin of the Institute of Metals,* v. 1, May 1952, p. 77-79. (Bound with *Journal of the Institute of Metals,* v. 80, May 1952.)

Use of the ultraviolet microscope for increasing resolution in metallurgical work. Photomicrographs. (M21)

235-M. The Alloys of Molybdenum and Tantalum. G. A. Geach and D. Summers-Smith. *Journal of the Institute of Metals,* v. 80, May 1952, p. 528.

A discussion by S. F. Radtke, W. C. Schumb, and M. B. Bever of above article (Nov. 1951 issue.) See item 2-M, 1952. (M24, Mo, Ta)

236-M. Titanium-Aluminum System. E. S. Bumps, H. D. Kessler, and M. Hansen. *Journal of Metals,* v. 4, June, 1952: *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 609-614.

The Ti-rich end of the Ti-Al phase diagram was determined to the compound $TiAl_3$ (62.7% Al). Micrographic analysis and X-ray diffraction were the chief methods used. 10 ref. (M24, Ti, Al)

237-M. Partial Titanium-Vanadium Phase Diagram. Paul Pietrokowsky and Pol Duwez. *Journal of Metals,* v. 4, June, 1952: *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 627-630.

Preparation of alloys and of experimental procedure. Results led to establishment of the constitution diagram between 980 and 650° C. Typical microstructures; graphical data. (M24, Ti, V)

238-M. Crystal Structure of ZrB_{12}. Benjamin Post and Frank W. Glaser. *Journal of Metals,* v. 4, June 1952: *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 631-632.

Investigated using powder diffraction. Graph and diagram. (M26, Zr, B)

239-M. Crystallographic Angles for Titanium and Zirconium. Carl J. McHargue. *Journal of Metals,* v. 4, June 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 660.

Calculated crystallographic angles are tabulated and shown graphically. (M26, Ti, Zr)

240-M. Furnace Construction and Thermocouple Arrangements for a High Temperature X-Ray Camera. Z. S. Basinski, W. B. Pearson, and J. W. Christian. *Journal of Scientific Instruments,* v. 29, May 1952, p. 154-155.

Modifications enable the actual specimen temperature to be measured accurately in the range 700-1000° C. Temperatures are measured and controlled by means of two rigidly fixed ring thermocouples of new design. (M23, S16)

241-M. Survey of Portions of the Chromium-Cobalt-Nickel-Molybdenum Quaternary System at 1200° C. Sheldon Paul Rideout and Paul A. Beck. *National Advisory Committee for Aeronautics,* Technical Note 2683, Apr. 1952, 81 pages.

Microscopic and X-ray diffraction studies. Solid-solubility limits of the quaternary alpha phase were determined up to 20% Mo. The component Co-Ni-Mo, Co-Cr-Mo, and Cr-Ni-Mo ternary systems were also studied. (Survey of these systems was confined to determination of the boundaries of the face-centered

cubic (alpha) solid solutions and of the phases co-existing with alpha at 1200° C.) 24 ref.
(M24, Cr, Co, Ni, Mo)

242-M. Growth Spirals Originating From Screw Dislocations on Gold Crystals. S. Amelinckx. *Philosophical Magazine,* ser. 7, v. 43, May 1952, p. 562-567.

Observations of growth spirals on faces of gold crystals, obtained by precipitation, prove that Frank's theory also holds for metal crystals. These observations constitute the first visual proof for the presence in metal crystals of dislocations in general, and screw dislocations in particular. They further show that the Burgers vector of dislocations in metals is not necessarily limited to one unit of a few simple lattice displacements, as is generally assumed. Diagrams. 16 ref.
(M26, Au)

243-M. Nuclear Resonance and the Electronic Structure of Transition Metals. W. D. Knight and C. Kittel. *Physical Review,* ser. 2, v. 86, May 15, 1952, p. 573.

Discusses recent work. (M25, P10)

244-M. On the Tantalum-Oxygen System. (In English.) Stig Lagergren and Arne Magneli. *Acta Chemica Scandinavica,* v. 6, no. 3, 1952, p. 444-446.

Starting materials for the investigation were Ta powder and Ta_2O_5, weighed amounts of which were intimately mixed, pressed, and heated in vacuo. The products were investigated by taking X-ray powder photographs. (M24, H general, Ta)

245-M. The Structure of the σ Phase in Vanadium-Nickel Alloys. (In English.) W. B. Pearson and J. W. Christian. *Acta Crystallographica,* v. 5, Mar. 1952, p. 157-162.

See abstract under similar title from *Nature,* item 66-M, 1952.
(M26, V, Ni)

246-M. The Crystal Structure of Ti_3Au and Ti_3Pt. (In English.) Pol Duwez and Charles B. Jordan. *Acta Crystallographica,* v. 5, Mar. 1952, p. 213-214.

Powder patterns indicate that Ti_3Au and Ti_3Pt crystallize in the A-15 (β-wolfram) structure with lattice parameters of 5.096 and 5.033 A, respectively. (M26, Ti, Au, Pt)

247-M. The Crystal Structure of β-Monoclinic Selenium. (In English.) Robinson D. Burbank. *Acta Crystallographica,* v. 5, Mar. 1952, p. 236-246.

Determined by application of Herker-Kasper phase inequalities and two-dimensional Fourier syntheses. Diffraction data demonstrate that a single crystal of β-Se can transform directly into metallic Se. During the transition, the molecules are broken down into smaller fragments which recombine to form the infinitely long helical chains of metallic Se. Relations between mixed crystals of S and Se, and between the various polymorphs of Se. 21 ref. (M26, Se)

248-M. The Crystal Structure of the Cadmium-Magnesium Alloy, CdMg. (In English.) H. Steeple. *Acta Crystallographica,* v. 5, Mar. 1952, p. 247-249.

Unit-cell dimensions; also atomic-scattering factors for both Cd and Mg at room temperature.
(M26, P10, Cd, Mg)

249-M. A Stroboscopic Effect in the X-Ray Analysis of Crystalline Aggregates. (In English.) H. J. Goldschmidt. *Acta Crystallographica,* v. 5, Mar. 1952, p. 256-259.

An X-ray diffraction technique, based on observation of a stroboscopic effect which results from synchronism between the speed of specimen rotation and pulse frequency of the incident X-ray beam. The effect consists in regular striation occurring at inclinations varying among diffraction spots; these striations can be caused to disappear by heat treatment. Structural details of a crystalline mass are revealed, which would otherwise not be apparent. A photograph showing striations gives simultaneously orientation and lattice spacing of a given crystallite, and allows differentiation between different crystal sizes. One potential application is to distinguish between strain and small particle size as causes of line broadening. (M22)

250-M. Use of the Electron Microscope in the Investigation of Metal Surfaces. I. Progress in Preparation Techniques. (In Dutch.) V. Ch. Dalitz and J. A. Schuchmann. *Metalen,* May 15, 1952, p. 153-161.

A convenient and rapid method for getting useful positive replicas from metal surfaces. An etched metal is placed in a high-vacuum bell jar and a thick layer of silver is deposited upon it by evaporation from a small crucible. This layer can easily be removed from various metals. The negative silver replica is coated with a thin film of SiO in vacuum. A still better positive replica results upon polymerization of a hydrocarbon upon the silver in a glow discharge. The silver is dissolved in HNO_3 and a shadow is applied. (M21)

251-M. Laminated Structure. (In French.) M. Remy. *Circulaire d'Informations Techniques,* v. 9, May 1952,

p. 682-698.

The band structure of various types of steel, such as Cr-Mo (18-CD4), Cr-Ni (16-NC-11), and Cr-Ni-Mo (30-NCD-16). Various examples of such structure and factors influencing its formation. Relationship between structure and mechanical properties. Micrographs. 18 ref. (M27, Q24, SS)

252-M. The Appearance of Preferred Orientation (112) in Plastically Deformed and Recrystallized Copper. (In French.) Paul Bastien and Jean Pokorny. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Apr. 1952, p. 1780-1782.

Results of investigation are compared with those of other investigators. (M26, N5, Cu)

253-M. Some Physical, Chemical, and Structural Phenomena Which Affect Mechanical Properties at Elevated Temperatures of Heat Resistant Austenitic Alloys. (In French.) P. Chevenard and X. Wache. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 18, Apr. 1952, p. 127-136.

Various methods for investigation. Results of application to various alloys of the above type are charted and tabulated. (M27, Q general, SS, SG-h)

254-M. The Molybdenum-Silicon System. (In German.) Richard Kieffer and Ernst Cerwenka. *Zeitschrift für Metallkunde,* v. 43, Apr. 1952, p. 101-105.

Production of alloys in above system by powder metallurgy and determination of phase relationships, hardness, and scaling resistance. Micrographs, macrographs, tables, and graphs. 20 ref. (M24, Mo, Si)

255-M. Systematization of the Structures of Alloys in Relation to the Heat of Formation. (In German.) Ulrich Dehlinger. *Zeitschrift für Metallkunde,* v. 43, Apr. 1952, p. 109-111.

Examination of principal structures shows that alloys can be placed into two classes, namely those with dense structures and alloys of open structure formed by heteropolar bonding. The latter include the Hume-Rothery alloys and the Zintl alloys. These two classes differ greatly in effect of atom concentration on heat of formation. Tables. (M26, P12)

256-M. Alloys of Titanium With Copper, Silver, and Gold. (In German.) Ernst Raub, Paul Walter, and Max Engel. *Zeitschrift für Metallkunde,* v. 43, Apr. 1952, p. 112-118.

Constitution diagrams were determined with the aid of thermal, microscopic, and X-ray investigations. Structures and properties of the nine systems of the metals of the 1st and 4th subgroup of the periodic system are compared. Only Cu and Au are found to alloy with Ti, while either solid or molten Ag is practically immiscible in Ti. Tables, graphs, and photomicrographs. 10 ref. (M24, Cu, Ag, Au, Ti)

257-M. Red-Tinted Alloys in the Copper-Zinc-Aluminum System. (In German.) Franz Lihl. *Zeitschrift für Metallkunde,* v. 43, Apr. 1952, p. 124-126.

In alloys with 30-50% Zn, increasing the Al content changes the color from light yellow to copper-red, which is ascribed to the β-phase. Tables and graphs show that the color effect of Al varies with the Zn content. (M24, P17, Al, Cu, Zn)

258-M. Quantum Mechanics of the Cubic Body-Centered Structures of the Transition Metals. (In German.) K. Ganzhorn. *Zeitschrift für Naturforschung,* v. 7a, Mar.-Apr. 1952, p. 291-292.

The contribution of d-electrons to bonding in the body-centered lattice can be explained by determining their configuration in the body-centered cubic lattice with the aid of group-theoretical considerations. (M26)

259-M. The Surface-Active Components of Steel. (In Russian.) S. M. Baranov. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Mar. 1, 1952, p. 125-128.

The influence of silicates with high and low contents of Si on the microstructure and crystal structure of low-alloy structural steels. Photomicrographs. (M26, M27, AY)

260-M. The Al-Cu-Mg System. (In Russian.) G. G. Urazov and M. S. Mirgalovskaia. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Mar. 11, 1952, p. 247-250.

A study was made of the phases of the above system. A new ternary composition diagram was prepared. Three sections of the new diagram are illustrated. (M24, Al, Cu, Mg)

261-M. Grain Shapes and Other Metallurgical Applications of Topology. Cyril Stanley Smith. *American Society for Metals,* "Metal Interfaces", 1952, p. 65-108; disc., p. 108-113.

Previously abstracted from *American Society for Metals,* Preprint 37, 1951; item 250-M, 1951. (M27, N3)

262-M. Effect of Included Oxide Films on the Structure of the Beilby Layer. A. J. W. Moore and W. J. McG. Tegart. *Proceedings of the Roy-*

al Society, ser. A, v. 212, May 22, 1952, p. 458-459.

Experiments show that, during repeated sliding, oxide is included to a considerable depth beneath the surface of the metal. Subsequent annealing at high temperatures shows that the included oxide particles prevent grain growth in the surface layers. This process may be largely responsible for the fine grain size of the Beilby layer. (M27, Q9)

263-M. Formation of Lubricant and Other Films on Clean Metal Surfaces: a Study by Electron Diffraction. R. Courtel. *Proceedings of the Royal Society,* ser. A, v. 212, May 22, 1952, p. 459-462.

Details of apparatus under construction under auspices of IRSID (Institut des Recherches Sidérurgiques Francaises) which is to be used for extending above investigations. (M22, P10)

264-M. A Dynamical Model of a Crystal Structure. IV. Grain Boundaries. W. M. Lomer and J. F. Nye. *Proceedings of the Royal Society,* ser. A, v. 212, May 22, 1952, p. 576-584.

Four photographs of bubble rafts, used as a basis for discussion of the structure of grain boundaries in pure metals, show the gradual transition from a small-angle boundary made up of clearly separate dislocations to a large-angle boundary where the dislocation structure is hardly recognizable. As the angle is increased, a continuous shortening of the dislocations, accompanied by the widening of a crack on the tensile side, is seen, and the process culminates in a structure which is described in terms of local fit and misfit. Range of validity of calculations of energy of dislocation walls, and slip and diffusion along grain boundaries. 21 ref. (M27)

265-M. Report of Committee E-4 on Metallography. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 482-485.

Previously abstracted from Preprint 86. See item 176-M, 1951. (M21)

266-M. Microstructural Instability of Steels for Elevated Temperature Service. G. V. Smith, W. B. Seens, H. S. Link, and P. R. Malenock. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 895-912; disc., p. 912-917.

Previously abstracted from Preprint 28. See item 205-M, 1951. (M27, Q6, Q29, AY, SS)

267-M. Report of Committee E-4 on Metallography. *American Society for Testing Materials,* Preprint 53, 1952, 29 pages.

Consists largely of Subcommittee Report on electron microstructure of bainite in steel. Illustrated by 23 micrographs. (M27, ST)

268-M. Titanium Alloy Development Mapped. W. Rostoker and H. D. Kessler. *Iron Age,* v. 169, June 19, 1952, p. 136-142.

Deals chiefly with equilibrium phase relationships between Ti and other metals; kinetics of solid-state reactions; and heat treatment phenomena. Information on a wide variety of alloys and systems of Ti. Phase and TTT-diagrams, and photomicrographs. 12 ref. (M24, N general, J general, Ti)

269-M. Demountable X-Ray Tube for Crystallography. T. B. Rymer and P. G. Hambling. *Journal of Scientific Instruments,* v. 29, June 1952, p. 192-194.

A medium-power, demountable, shockproof X-ray tube. Construction is simple; various parts fit together to form a very rigid unit easily dismantled and reassembled without disturbing the focus. Photograph and sectional drawing. (M26)

270-M. Carbides in High Speed Steel—Their Nature and Quantity. Francis Kayser and Morris Cohen. *Metal Progress,* v. 67, June 1952, p. 79-85.

Each of eight grades of high speed steel was investigated for types of carbides present, volume and weight percentage, and transformations occurring during commercial austenitizing. Tables and graphs. (M26, J22, TS)

271-M. Universal Specimen Mount for Pole Figure Determination Using the Schulz-Decker Technique. D. N. Williams and D. S. Eppelsheimer. *Review of Scientific Instruments,* v. 23, May 1952, p. 229-231.

A universal specimen mount is developed for use with a Geiger counter-equipped X-ray unit to take advantage of the technique suggested by Schulz, Decker, Asp, and Harker. Sample pole figures of cold-rolled Ti and α-brass are presented. (M23, Ti, Cu)

272-M. X-Ray Helps Produce Better Wire by New Methods Which Analyze Crystal Structure of Base Metals. John Buhler. *Wire and Wire Products,* v. 27, June 1952, p. 570-573.

Use of X-ray diffraction. Compares X-ray diffraction and spectrometry with X-ray fluoresence. Application in qualitative and quantitative work. (M22, Ag, Cu, Ni, Cr)

273-M. (Czech.) Comparison of Various Methods of Determining Au-

stenitic Grain Sizes in Steel. F. Labonek and L. Jenicek. *Hutnické Listy,* v. 7, Apr. 1952, p. 171-178.

The "fracture grain size" method is recommended for general use, the Gerasimenko and Cu-diffusion methods should be used only for quality control, and the McQuaid-Ehn method should be used only for carburizing steels. 92 ref. (M27, ST)

274-M. (German.) The Conception of Determination of Homogeneity. H. Franssen. *Metall,* v. 6, June 1952, p. 302-305.

Theoretical considerations and methods of measurement. Illustrated by measurements on different materials (porous, sintered lead bronze on an iron base; structural steel; carbonyl iron; Cu-Ni alloy, bessemer steel; Cr-Mo steel; and nonmetallics.) Tables and graphs. (M27)

275-M. Electron-Diffraction Study of Iron Carbides in Bainite and Tempered Martensite. A. E. Austin and C. M. Schwartz. *American Society for Testing Materials,* Preprint 165, 1952, 4 pages.

Samples of bainite and tempered martensite, etched to leave the carbide phases in relief, were examined by electron diffraction. The steel was essentially plain carbon, of eutectoid composition. Cementite was found in samples isothermally transformed or quenched and tempered at or above 500° F. Both cementite and epsilon iron carbide exist at 500° F. In martensite tempered at 400° F., only epsilon iron carbide was found. (M22, N8, CN)

276-M. A Method for the Electron and Optical Microscopic Examination of Identical Areas. E. D. Hyam and J. Nutting. *British Journal of Applied Physics,* v. 3, June 1952, p. 173-176.

A refinement of the usual stripping technique. An attachment fits over the objective lens of a bench metallurgical microscope, and enables replica-supporting grids to be precisely positioned over a feature of interest in the microstructure of a metal surface. Operation and application. Apparatus drawings and micrographs. (M21)

277-M. Micro-Analysis in Metallurgy; a Survey of German Investigations. *Chemical Age,* v. 66, June 7, 1952, p. 865-868.

Recent German work, using metallographic techniques. (M21, S11)

278-M. Intensity Calculation for Determining Weight Percentage in a Binary Alloy by X-Ray Fluorescent Analysis. P. K. Koh, B. Caugherty, and R. E. Burket. *Journal of Applied Physics,* v. 23, June 1952, p. 698.

A simple calculation applicable when the binary alloy consists of neighboring elements in the periodic table. Example is given for an Fe-Co alloy. Table. (M26, Co, Fe)

279-M. Borides of Some Transition Metals. Benjamin Post. *Journal of Chemical Physics,* v. 20, June 1952, p. 1050-1051.

Several unreported transition metal borides were prepared in a high-temperature investigation of several metal-C-B systems. Some structural characteristics of these new phases were determined by means of an X-ray diffraction investigation of powdered samples. (M26, W, B, Mo, Ti, Zr)

280-M. The Structure and Some Properties of Titanium-Oxygen Alloys Containing 0-5 At. % Oxygen. A. E. Jenkins and H. W. Worner. *Journal of the Institute of Metals,* v. 80, Dec. 1951, p. 157-166.

By means of measurements of thermo-electric power at various temperatures and by quenching experiments on alloys made with refined Ti, limits of the $(\alpha + \beta)$ region up to 5 at. % O_2 were established. The impurities present in the commercial grade of metal cause a marked broadening of the $\alpha \rightleftharpoons \beta$ transformation range. It was found possible to develop techniques for forging and swaging alloys containing as much as 3.5 at. % O_2. Alloys containing more than 1.5 at. % may be hot worked, but they are more or less brittle at normal temperatures. Factors affecting cold drawing and annealing of alloy wires were studied. Proof stress, nominal ultimate stress, plastic elongation, and hardness of annealed alloys were determined. 12 ref. (M27, F22, Q general, Ti)

281-M. The Sigma Phase in Binary Alloys of the Transition Elements. A. H. Sully. *Journal of the Institute of Metals,* v. 80, Dec. 1951, p. 173-179.

Appearance of sigma phase can be satisfactorily accounted for if it is assumed that incidence is determined by a critical excess of electrons in bond orbitals over vacancies in the 3d atomic orbitals. In alloys of Co and Fe with Cr, Fe, Ni, and Co with V, and Cr and V with Mn, predictions of the boundary of the homogeneous sigma-phase region made on the basis of this hypothesis agree well with experimental data where available. 28 ref. (M26)

282-M. Observations on Nodular Graphite. H. M. Weld, R. L. Cunningham, and F. W. C. Boswell. *Journal of Metals,* v. 4, July 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 738-742.

Chemical analysis shows that the partition of the Mg addition between the metal and the graphite is independent of whether the graphite is in the form of nodules or flakes. The bright central spot observed in nodular-graphite polished sections is shown to be due to the structure of the nodules. Tables, diagrams, and electron micrographs. 13 ref. (M27, CI)

283-M. A Study of Grain Shape in an Aluminum Alloy and Other Applications of Stereoscopic Microradiography. W. M. Williams and Cyril Stanley Smith. *Journal of Metals,* v. 4, July 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 755-765.

Introduces a new method of studying individual grains in alloys which may find use in other metallurgical researches. Using stereoscopic microradiography, the shape of 91 contiguous grains in a worked and annealed Al-Sn alloy were analyzed and some topological quantities calculated. Diagrams, tables, micrographs; stereoscopic radiographs and drawings. 18 ref. (M23, M27, Al)

284-M. Titanium-Copper Binary Phase Diagram. A. Joukainen, N. J. Grant, and C. F. Floe. *Journal of Metals,* v. 4, July 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 766-770.

Methods used for determination of the diagram include metallographic examination and X-ray and thermal analyses. The system was first worked out using high-purity sponge Ti and O_2-Cu. The high-Ti region was next determined more accurately, using iodide Ti and vacuum-melted, O_2-free Cu. Graphs, photomicrographs and X-ray patterns. (M24, Cu, Ti)

285-M. Titanium-Oxygen Alloys. *Metal Progress,* v. 61, May 1952, p. 124-126, 128. (Condensed from "The Structure and Some Properties of Titanium-Oxygen Alloys Containing 0-5 At.% Oxygen". A. E. Jenkins and H. W. Worner.)

Previously abstracted from *Journal of the Institute of Metals.* See item 280-M, 1952. (M27, F22, Q general, Ti)

286-M. X-Ray Studies of Metal Structures. W. H. Taylor. *Metal Treatment and Drop Forging,* v. 19, June 1952, p. 259-262.

Postwar research at Crystallographic Laboratory, Cambridge. Main topics are: X-ray microbeam technique; X-ray examination of modulated structure in alloys; alloys of Al with transition metals; and sigma-phase alloys. 41 ref. (M26, M27)

287-M. The Effect of Four Transition Metals on the α/β Brass Type of Equilibrium. J. B. Haworth and W. Hume-Rothery. *Philosophical Magazine,* ser. 7, v. 43, June 1952, p. 613-619.

Experimental investigation of the effect of Mn, Fe, Co, and Ni on the α/β equilibrium in Cu-Zn and Cu-Al alloys at 672° C. For this purpose the isothermal sections of the ternary systems in the regions concerned were determined by annealing and microscopical examination. The bearing of the results on the theory of the transition metals and their alloys. (M24, N6, Mn, Fe, Co, Ni)

288-M. Elementary Structure and Slip Band Formation in Aluminium. D. Kuhlmann-Wilsdorf. *Philosophical Magazine,* ser. 7, v. 43, June 1952, p. 632-644.

From electron micrographs of deformed high-purity Al, numerical estimates for spacing, length, and amount of glide of the individual elementary lines were obtained. Experimental evidence relating to the problem, whether or not slip starts at the crystal surfaces. 25 ref. (M27, Q24, Al)

289-M. (German.) **The Iron-Phosphorus-Antimony Phase Diagram.** Rudolf Vogel and Dietrich Horstmann. *Archiv für das Eisenhuttenwesen,* v. 23, Mar./Apr. 1952, p. 127-134.

The above system was investigated as to structure and thermal behavior. A process is developed which makes it possible, by adding Cu, to determine metallographically and chemically the saturation content of P in molten Sb. Phase diagram of the system, and the conditions for a second ternary boiling point. Graphs, diagrams, and micrographs. (M24, Fe, Sb, P)

290-M. (German.) **The Top-Illumination, Phase-Contrast Microscope and Its Use in Metallography.** Erich Witten. *Archiv für das Eisenhuttenwesen,* v. 23, Mar./Apr. 1952, p. 145-150.

Microscope with a new top-illumination, phase-contrast set-up. Examples of application. (M21)

291-M. (German.) **The Iron-Phosphous-Manganese System.** Rudolf Vo-

gel and Josef Berak. *Archiv für das Eisenhüttenwesen,* v. 23, May-June 1952, p. 217-223.

Proposes a phase diagram of the Fe-Fe_2P-Mn_2P-Mn system on the basis of thermal and structural investigations. Graphs and micrographs. 15 ref. (M24, Fe, Mn, P)

292-M. (German.) **Quantitative Description of Crystal Structure by Means of Displacements.** Albert Kochendörfer. *Zeitschrift für Electrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Apr. 1952, p. 283-294.

Displacements and their properties. The possibility of defining the structure of the real crystals by means of the displacements. Grain and mosaic junction lines, displacements as a source of defects, and mosaic structure. Diagrams. 45 ref. (M26)

293-M. (German.) **Slip Shrinkage in Mixtures of Metals and Metallic Oxides, and in Boron Carbide.** Walther Dawihl. *Zeitschrift für Metallkunde,* v. 43, May 1952, p. 138-142.

Proposes application of the theory that formation of slip layers causes shrinkage in metals and also in mixtures of metals with metallic oxides. Method of experimentation. Results obtained with mixtures of Fe and oxides of Al, Cr, Mg, Mn, Ti, or Fe are charted, tabulated, and illustrated by micrographs. Also results obtained with B_4C. (M26, Q24, Fe, C-n)

294-M. (Russian.) **Change of Coordination Number During Melting of Metals.** O. Ia. Samoilov. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Mar. 21, 1952, p. 447-450.

Previously published data are used for a theoretical discussion of the change of structures of metals as the melting point is approached. Data are tabulated and charted for a series of nonferrous metallic elements. (M27, N12)

295-M. (Russian.) **Radiographic Investigation of Fracture Surfaces of Impact Specimens.** M. P. Zheldak. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Apr. 21, 1952, p. 843-845.

X-ray studies were made on fractured Mesnager specimens of highly alloyed, semiferritic steel, over a range from −20 to 100° C. Includes diffraction patterns. (M22, Q6, AY)

296-M. (Russian.) **Investigation of Alloys of the Fe-Cr System and Certain Alloys of the Fe-Cr-Mn System by a Magnetic Analysis Method.** N. I. Korenev and E. I. Koreneva. "Izvestiia Sektora Fiziko-Khimicheskogo Analiza", v. 20 (Academy of Sciences of the USSR), p. 54-65.

Data from magnetic analysis of the above alloys agrees with the results of hardness tests, microstructure, and X-ray analyses. 14 ref. (M23, Fe, Cr, Mn)

297-M. (Russian.) **Equilibrium Diagram of the Copper-Magnesium-Zinc System.** V. I. Mikheeva and O. N. Kruikova. "Izvestiia Sektora Fiziko-Khimicheskogo Analiza", v. 20, (Academy of Sciences of the USSR), p. 76-93.

Experimental data were obtained to construct the above diagram. Data are tabulated and charted. Includes 24 photomicrographs. 13 ref. (M24, Cu, Mg, Zn)

298-M. (Russian.) **Methods of Investigating the Structure of Metals With the Electron Microscope.** D. S. Shraiber. "Izvestiia Sektora Fiziko-Khimicheskogo Analiza", v. 20 (Academy of Sciences of the USSR), p. 304-316.

Construction and use of the electron microscope for metallographic studies. Various techniques. Includes several photomicrographs. (M21)

299-M. (Spanish.) **Technique of Preparation and Mounting of Crystals for Analytical X-Ray Diffraction Studies.** I. Asensio Amor. *Nucleo,* v. 7, May 1952, p. 186-190.

A review on the basis of the literature. The case in which the substance is placed in a capillary tube; where the substance must adhere to the capillary tube; and where the substance is placed in special devices. 54 ref. (M22)

300-M. The Formation of the Ni_3Al Phase in Nickel-Aluminium Alloys. R. W. Floyd. *Journal of the Institute of Metals,* v. 80, June 1952, p. 551-553.

The Ni_3Al phase is the product of a peritectic reaction between the melt and the β(NiAl) phase. This was established by a comparison of the microstructures of small ingots of a series of binary Ni-Al alloys containing 20-30 at.% Al, with those of a corresponding series in which 2½ at.% of the Ni was replaced by Cr. Phase diagrams and photomicrographs. (M24, Ni, Al)

301-M. Crystal Structure of the Intermetallic Compound $Mg_{32}(Al, Zn)_{49}$ and Related Phases. Gunnar Bergman, John L. T. Waugh, and Linus Pauling. *Nature,* v. 169, June 21, 1952, p. 1057-1058.

A complete structure determination was made by the stochastic method. Verification of the structure with X-ray data was obtained from single crystals of the Mg-Al-Zn alloy. (M26, Mg, Al, Zn)

302-M. (Book) **Industrial High Vacuum.** J. R. Davy. 243 pages. 1951. Sir

Isaac Pitman & Sons, Ltd., Parker St., Kingsway, London W.C. 2, England.

A comprehensive survey dealing with design and manipulation of vacuum installations. Sufficient basic theory for understanding the principles involved. Application to major uses, methods of handling, and control of the products. Chapters of special metallurgical interest are: evaporation technique for thin films; deposition of metals; detailed treatment of some metals; semitransparent films; further applications and properties of thin films; and vacuum metallurgy. (M23, L25, C25)

303-M. Some Recent Developments in Metallurgical Microscopy. R. C. Gifkins. *Australasian Engineer,* May 7, 1952, p. 63-70.

Equipment, procedures, and typical results. 30 ref. (M21)

304-M. X-Ray Investigation of the Epsilon Phase in an Fe-Mn Alloy. J. Gordon Parr. *Journal of the Iron and Steel Institute* v. 171, June 1952, p. 137-141.

X-ray investigation of alloy containing 18.5% Mn confirms that the ε phase has a close-packed hexagonal structure, but refutes a previously assumed crystallographic relationship between the γ and ε phases. Relative amounts of the α, γ, and ε solid solutions in heat treated powder specimens were determined by an X-ray method, and led to the conclusion that the ε phase is produced by a process of athermal nucleation, not an equilibrium phase. Tables, graph. 14 ref. (M26, N2, Fe)

305-M. A Weissenberg X-Ray Diffraction Camera. C. A. Beevers. *Journal of Scientific Instruments,* v. 29, July 1952, p. 230-232.

A camera suitable for Weissenberg and other types of X-ray diffraction photographs. The special features are its simple and substantial construction, and the large diameter of filmholder and consequent large size of the photograph. The distance from focal spot to crystal is 100 mm. and thus exposure times are particularly short. (M22)

306-M. An Adjustable Debye-Scherrer X-Ray Camera for Specimens of Large Diameter. A. Taylor. *Journal of Scientific Instruments,* v. 29, July 1952, p. 236.

Two techniques, one for specimens up to ½ in., and the other, up to ¾ in. diam. Diagrams. (M22)

307-M. Modified Picral for Higher Alloy Steels. A. E. Nehrenberg. *Metal Progress,* v. 62, July 1952, p. 91-92.

Experiences in use of picral solution modified by addition of HCl. Photomicrographs of etched stainless steel. (M21, SS)

308-M. The Unit Cell and Brillouin Zones of $Ni_6Mn_{11}Al_{20}$ and Related Compounds. Keith Robinson. *Philosophical Magazine,* ser. 7, v. 43, July 1952, p. 775-782.

Tables, graphs. 10 ref. (M26, Ni, Mn, Al)

309-M. Influence of the Apparatus Function on Crystallite Size Determinations With Geiger Counter Spectrometers. F. R. L. Schoening, J. N. van Niekerk, and R. A. W. Haul. *Proceedings of the Physical Society,* sec. B, v. 65, July 1, 1952, p. 528-535.

A brief survey of the various methods used for determining crystallite sizes from X-ray-diffraction line broadening. Experiments illustrate the effect of sample preparation, absorption, etc., on measurements of line breadth. Graphs. 19 ref. (M22)

310-M. Imperfections in Nearly Perfect Crystals: A Synthesis. Frederick Seitz. "Imperfections in Nearly Perfect Crystals", (John Wiley & Sons, New York), 1952, p. 3-76.

There are six primary types of crystal imperfections: phonons, electrons and holes, excitons, vacant lattice sites and interstitial atoms, foreign atoms in either interstitial or substitutional position, and dislocations. In addition to the primary imperfections, there are three transient imperfections: light quanta, charged radiations and uncharged radiations. Available experimental information concerning the interaction of imperfections is classified. Emphasis is placed both on individual characteristics of imperfections and on means by which they are generated. Numerous references. (M26)

311-M. On the Geometry of Dislocations. W. T. Read, Jr. and W. Shockley. "Imperfections in Nearly Perfect Crystals" (John Wiley & Sons, New York), 1952, p. 77-94.

Dislocations are one of the few types of defects which naturally occur in crystalline substances. All dislocation types are classified according to a simple scheme which makes use of the Burgers circuit and the Burgers vector. Both complete and partial dislocations are considered. Slipping and diffusive motions of dislocations are illustrated, and a dislocation theory of straight vs. wavy slip bands is suggested. The intersection of dislocations is shown to result in kinks or jogs in the dislocation lines which impede the slipping motions and may create vacancies and interstitial atoms. The Frank-Read mech-

anism of dislocation multiplication is reviewed. (M26)

312-M. Imperfections From Transformation and Deformation. C. S. Barrett. "Imperfections in Nearly Perfect Crystals" (John Wiley & Sons, New York), 1952, p. 97-125, disc., p. 126-128.

Stacking faults (twin faults) can be detected and analyzed by diffraction patterns made with polycrystalline metals oscillating through small angles; line broadening in powder patterns can also be used. Plastic deformation causes faulting in certain Cu-Si, Au-Cd, Ag-Sn, and Ag-Sb alloys, and perhaps also in Cu-Zn alloys (possibly also in Cu and Ag at low temperatures), but not in Al or 24S-T Al alloy. The faulting that accompanies transformation in Co, Li, and Li-Mg is ascribed to strains of the martensitic-type transformation. Other distortions connected with plastic flow are enumerated. 45 ref. (M26, N9, Q24)

313-M. Experimental Information on Slip Lines. W. T. Read, Jr. "Imperfections in Nearly Perfect Crystals" (John Wiley & Sons, New York), 1952, p. 129-146; disc., p. 146-151.

A brief review of experimental information, no attempt being made at interpretation. For the most part, the results refer only to metal single crystals; the various metals are considered one after another. Investigations reported were on slip direction and slip plane, form of the slip lines, spacing of the various classes of slip lines, and amount of slip per line. Techniques for study of influence of experimental conditions on slip lines. 38 ref. (M26, Q24)

314-M. Substructures in Crystals. A. Guinier. "Imperfections in Nearly Perfect Crystals" (John Wiley & Sons, New York), 1952, p. 402-436; disc., p. 436-440.

Sub-boundaries divide crystalline grains into smaller elements, called subgrains, which are slightly disoriented. They are revealed with the optical or electron microscope by special etching reagents or by their property of favoring the formation of precipitates in supersaturated solid solutions or collection of impurities. Sensitive X-ray techniques give relative orientations of the subgrains. Techniques and typical observations on various metals, alloys, and nonmetallic crystals. 43 ref. (M26)

315-M. The Properties and Effects of Grain Boundaries. Bruce Chalmers. "Imperfections in Nearly Perfect Crystals" (John Wiley & Sons, New York), 1952, p. 441-450; disc., p. 450.

A distinction is made between properties and the effects of grain boundaries; effects of boundaries on plastic deformation; possibility of a noncrystallographic mode of deformation. Strength (shear and normal) and fusion (chemical and electrochemical). 19 ref. (M27, Q24)

316-M. (French.) **Micrographic Determination of the Grain Size of Aluminum and Its Alloys.** Jean Hérenguel: *Revue de l'Aluminium,* v. 29, June 1952, p. 221-229.

Application to Al and its alloys of methods of intergranular attack and grain orientation for determination of grain size. Typical micrographs 11 ref. (M27, Al)

317-M. (French.) **The Fine Structure of Bragg Reflections, and Imperfections in Metallic Crystals.** Honoré Lambot and Lawrence Vassamillet. *Revue de Métallurgie,* v. 49, June 1952, p. 408-410.

Proposes a simple method for obtaining images of crystal defects, using monochromatic radiation. Details of the investigation. Micrographs. (M26)

318-M. (German.) **Operation and Possibilities of Application of the Field Electron Microscope in Metallurgy.** M. Drechsler and E. W. Moller. *Metall,* v. 6, July 1952, p. 341-345.

Possibility of obtaining micrographs showing course of chemical reactions taking place in the upper monomolecular adsorption layer. Various examples, such as investigations on self-diffusion processes, adsorption, reactions on metal surfaces, and diffusion of carbon. Diagrams and micrographs. 10 ref. (M21, N1)

319-M. (German.) **Investigations on Segregations in Superhard MgAl Malleable Alloys.** W. Mannchen. *Metall,* v. 6, July 1952, p. 360-362.

Experiments on Mg alloy containing 7% Al, 1% Zn, 0.1% Mn, to determine the percentage of segregations, their number, and their mean absolute surface. Results are tabulated and charted. (M28, Mg)

320-M. (French.) **Data on the Diffusion of Small-Angle X-Rays by the Structure of Age Hardened Alloys. Case of Aluminum-Silver Alloys.** A. Guinier. *Zeitschrift für Metallkunde,* v. 43, June 1952, p. 217-223.

The origin of such diffusion, with special emphasis on defective crystals. Annealing at high and at low temperatures. Graphs and micrographs. 16 ref. (M22, Al, Ag)

321-M. The Metallographic Preparation of Porous and Friable Coatings. D. Caplan and P. E. Beaubien. *Canadian Journal of Technology,* v. 30, July-Aug. 1952, p. 211-213.

During the metallographic examination of the scale layers on heat resistant alloys, great difficulty was experienced in preparing polished cross-sections because of the tendency of the porous and fragile oxide layers to disintegrate during cutting, mounting, grinding, and polishing. The usual method of mounting in plastic by pressure molding not only crushed the layers but did not permit the supporting plastic to enter into the interstices. A double vacuum-impregnation technique using two liquid plastics gave satisfactory results. (M21, R2)

322-M. Develop New Technique for Metal Structure Study. R. B. Pond and N. K. Chen. *Iron Age,* v. 170, Aug. 7, 1952, p. 122-126.

Motion-micro study, an unusual technique developed at Johns Hopkins University. A motion picture camera hooked to a microscope was used to take pictures of liquid-solid transformations of low-melting-point alloys. A special micro-tensile testing machine, equipped with strain gages and Dynalog recorder, was developed to deform and measure the extent of strain. This combination setup was used to study plastic deformation of high-purity Al crystals grown by gradual solidification from the liquid metal. (M23, Q24, Al)

323-M. Specimen Charging in the Electron Microscope and Some Observations on the Size of Polystyrene Latex Particles. S. G. Ellis. *Journal of Applied Physics,* v. 23, July 1952, p. 728-732.

From observations in the shadow electron microscope and the standard electron microscope, it is concluded that specimen charging does not significantly change the magnification of the latter, provided that the specimen is less than a few microns in thickness and that the illuminating electron beam simultaneously strikes a nearby grounded conductor such as the supporting mesh. The difference in size of shadowed and unshadowed Dow Latex 580G, Lot 3584, reported by Kern and Kern, is attributed to an added layer of material on the shadowed particles. Evidence in support of this view and results of other workers. (M21)

324-M. The Reliability of Internal Standards for Calibrating Electron Microscopes. John H. L. Watson and William L. Grube. *Journal of Applied Physics,* v. 23, July 1952, p. 793-798.

Particles of Dow Latex 580G are unstable under electron beams and best micrographed at low intensity. Two different effects of radiation are noted. 580G is improved as an internal standard if recalibrated by some other suitable standard each time before use. Fresh replicas of diffraction gratings are still the most practical standards, reproducing gratings of .2%. A reliable method of calibration using 580G is suggested. (M21)

325-M. The Constitution of Nickel-Rich Alloys of the Nickel-Chromium-Titanium System. A. Taylor and R. W. Floyd. *Journal of the Institute of Metals,* v. 80, July 1952, p. 577-587.

The binary Ni-Cr and Ni-Ti systems were re-examined by X-ray diffraction and micrographic techniques, and new equilibrium diagrams for them are presented. A detailed investigation was also carried out on Ni-rich Ni-Cr-Ti alloys from which partial equilibrium diagrams corresponding to the 750, 1000, and 1150° C. isothermals were constructed. The boundary separating magnetic from nonmagnetic ternary γ-phase alloys at 20° C. is indicated in the equilibrium diagram. 37 ref. (M24, Ni, Cr)

326-M. The Constitutional Diagram of the Chromium-Tungsten System. H. T. Greenaway. *Journal of the Institute of Metals,* v. 80, July 1952, p. 589-592.

Investigated by metallographic, X-ray, and thermal analysis. The liquidus rises, slowly at first and then more rapidly, from the freezing point of Cr toward that of W. Above 1500° C., the solid alloys consist of a continuous series of solid solutions; below 1500° C., the single phase breaks down into two limited solid solutions, which thus form a solubility gap in the diagram. (M24, Cr, W)

327-M. Lattice-Spacing Relationships in Aluminium-Rich Solid Solutions of the Aluminium-Magnesium and Aluminium-Magnesium-Copper Systems. D. M. Poole and H. J. Axon. *Journal of the Institute of Metals,* v. 80, July 1952, p. 599-604.

Two samples of Mg of different purities were used. Increasing the purity of the Mg reduces curvature of the relationship at low concentrations of Mg and causes the linear portion of the curve to become more steep. The Al-rich Al-Mg-Cu solid solution was also investigated, using Mg of high purity. 11 ref. (M26, Al)

328-M. Factors Affecting Equilibrium in Certain Aluminium Alloys. E. C. Ellwood. *Journal of the Institute of Metals,* v. 80, July 1952, p. 605-608.

Lattice spacings and densities of solid solutions of Cu, Mg, and Ag in Al were measured at 25° C. No anomalies were found in the Al-Cu solution. In the Al-Mg solution, the slight curvature in the lattice-spacing-composition curve reported by Axon and Hume-Rothery is confirmed, and vacant sites are formed in the solid solution. It is deduced that anomalies are the result of Brillouin-zone overlaps. (M26, Al)

329-M. The Factors Affecting the Formation of 21/13 Electron Compounds in Alloys of Copper and of Silver. W. Hume-Rothery, J. O. Betterton, and J. Reynolds. *Journal of the Institute of Metals,* v. 80, July 1952, p. 609-616.

An attempt was made to discover the factors that control the composition limits of phases with the γ-brass structure in different alloy systems. The Brillouin zone of the structure is described. Data for Cu-Al and Cu-Ga alloys show that, when the electron concentration reaches about 1.70, atoms begin to drop out of the structure in such a way that the number of electrons per unit cell remains constant. The data for all the systems indicate that this is a critical electron concentration beyond which a normal structure with its full complement of atoms cannot exist. 19 ref. (M25, Cu, Ag)

330-M. The Lattice Spacings and Densities of Gold-Nickel Alloys at 25° C. E. C. Ellwood and K. Q. Bagley. *Journal of the Institute of Metals,* v. 80, July 1952, p. 617-619.

Anomalies in lattice spacing and density were found in the solid solutions of Au and Ni. It is concluded that Brillouin-zone overlaps occur in the solid solution, accompanied by formation of vacant lattice sites. By analogy with other Au-rich solid solutions and from the calculation by Jones and Mott of the N(E) curve for the face-centered-cubic metal Cu, it is concluded that Ni has a valency of 3.2 when dissolved in Au up to 60 at. —%. (M26, P10, Au, Ni)

331-M. Microstructural Changes in the High-Alloy Valve Steel XCR. B. Cina. *Journal of the Iron and Steel Institute,* v. 171, July 1952, p. 229-237.

To study the complex diffusion processes involved in the approach to equilibrium of a Cr-Ni-Mo-C valve steel at temperatures up to 1150° C., the microstructural changes produced by heat treatment at several temperatures were studied at room temperature by optical microscopy, X-ray diffraction, and hardness determinations, and a correlation found between results obtained by the three methods. Tables and four pages of photomicrographs. 15 ref. (M21, M22, M23, SS)

332-M. A New Device for Metallic Shadow-Casting. Tadatosi Hibi. *Review of Scientific Instruments,* v. 23, July 1952, p. 383-385.

A new device for metallic shadow-casting by using a nozzle system is proposed, and an outline of the apparatus is shown. Advantages of this system. Photomicrographs. (M23)

333-M. Microscopic Studies of Tungsten Wire. Robert B. Reid. *Sylvania Technologist,* v. 5, July 1952, p. 75-76.

Photomicrographs show the effects of fissures and advanced grain growth in tungsten wire and the contamination of tungsten filaments due to contact with metal or lubricating-oil vapor. (M27, W)

334-M. (English.) **The Structure of β (AlMnSi)-Mn_3SiAl_9.** Keith Robinson. *Acta Crystallographica,* v. 5, July 1952, p. 397-403.

X-ray examination of single crystals of ternary compounds occurring in the Al-Mn-Si system forms part of the research of structural work on Al-rich intermetallic compounds, being carried out in conjunction with the metallographic examination of alloys by the University of Birmingham, England. Tables and graphs. 15 ref. (M26, Al, Mn, Si)

335-M. (English.) **The Iron-Nitrogen System: The Crystal Structures of ε-Phase Iron Nitrides.** K. H. Jack. *Acta Crystallographica,* v. 5, July 1952, p. 404-411.

Part of a chemical and structural investigation of binary and ternary interstitial alloys of Fe, C, and N_2. 15 ref. (M26, Fe)

336-M. (English.) **A Device for Calculating Structure Factors.** W. L. Bragg. *Acta Crystallographica,* v. 5, July 1952, p. 474-475.

Device consists of dials on a pivoted table which are set to create moments proportional to the terms, and the sum is obtained by restoring the balance with an applied torque. (M23)

337-M. (English.) **On the Relations Between Fourier and Least-Squares Methods of Structure Determination.** D. W. J. Cruickshank. *Acta Crystallographica,* v. 5, July 1952, p. 511-518.

A criterion for determining atomic coordinates in the Fourier method, applicable to resolved or unresolved

peaks, is introduced. A criterion for finding atomic coordinates from the Patterson density leads to refinement equations which are similar to the normal equations. Both centrosymmetric and non-centrosymmetric space groups are considered. Approximate forms of the equations and the relationship of this work to earlier work by Booth, Cochran, and Cruickshank. (M22)

338-M. (English.) **Tables of Absorption Factors for Spherical Crystals.** H. T. Evans, Jr. and Miriam G. Ekstein. *Acta Crystallographica,* v. 5, July 1952, p. 540-542.

Tables give the absorption factor in terms of two variables. The tables are analogous to the standard ones for cylinders. (M26)

339-M. (English.) **The Diffraction of X-Rays by a Random Assemblage of Molecules Having Partial Alignment.** Herbert D. Deas. *Acta Crystallographica,* v. 5, July 1952, p. 542-546.

The medium considered consists of molecules or other like particles. The intensity distribution for X-ray diffraction is expressed in Fourier space in terms of the intensity distribution (Patterson transform) of the single molecule. Two examples are given, one of which contains, as a special case, the previously determined effect of finite linear gratings in random orientation. (M22)

340-M. (English.) **A Graphical Method for Applying Harker-Kasper Inequalities to Structure Determination.** Kiichi Sakurai. *Acta Crystallographica,* v. 5, July 1952, p. 546-548.

Details of calculations and graphical interpretation of the method. (M22)

341-M. (English.) **The Habit Plane of the Zirconium Transformation.** A. J. J. van Ginneken and W. G. Burgers. *Acta Crystallographica,* v. 5, July 1952, p. 548-549.

Results of investigation. (M26, Zr)

342-M. (English.) **Some Theoretical Aspects About the Second Order Superlattice in Body Centered Cubic Lattice.** Hiroshi Sato. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Feb. 1951, p. 24-33. (M26)

343-M. (English.) **Research on the Copper-Rich Solid Solution in Cu-Mn Binary System. I.** Masayuki Kawasaki, Kenkichi Yamaji, and Osamu Izumi. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Feb. 1951, p. 66-77.

Alloys in Cu-Mn system containing up to 61.3% Mn were investigated from various standpoints, namely microstructure, hardness changes due to various heat treatments, temperature dependence of electric resistivity and thermal expansion, and density at room temperature. (M24, Cu, Mn)

344-M. (English.) **On the Equilibrium Diagram of Iron-Manganese System.** Hiroshi Yoshisaki. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Apr. 1951, p. 137-150.

Study was carried out with alloys containing 50-100% Mn, by means of measurements of thermal expansion, magnetic analysis, microscopic examination, and X-ray examination. Numerous micrographs. (M24, Fe, Mn)

345-M. (English.) **On the Liquidus Line of Fe-Mn Alloys.** Mitsutake Isobe. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Apr. 1951, p. 151-154.

Equilibrium diagram of Fe-Mn alloys containing more than 50% Mn was studied by means of thermal analysis. Tables, graphs, and discussion. (M24, Fe, Mn)

346-M. (French.) **Orientation Relationships Between Cementite and α-Iron.** J. J. Trillat and S. Oketani. *Acta Crystallographica,* v. 5, July 1952, p. 469-471.

Single-crystal films of α-Fe were formed by evaporation onto a cleavage face of NaCl heated to 600-700° C. followed by annealing at 700° C. Preparations of α-Fe were carburized at 500° C. in an atmosphere of Co + H_2 and then examined by electron diffraction. 12 ref. (M27, Fe)

347-M. (French.) **Unidimensional Disorder in SiC and Its Influence on the Diffraction Intensity of X-Rays.** R. Gevers. *Acta Crystallographica,* v. 5, July 1952, p. 518-524.

Theory is developed for the X-ray scattering by SiC crystals of the usual 4, 6 and 15-layer types, which show order in two translation directions but disorder in the third direction. (M22, Si, C-n)

348-M. (French.) **The Existence of a New Phase in Chromium-Molybdenum Steel.** L. Habraken. *Revue universelle des Mines, de la Métallurgie des Travaux publics, des Sciences et des Arts appliqués a l'Industrie,* ser. 9, v. 8, July 1952, p. 281-284.

Details of investigation. Role of this phase in creep resistance at elevated temperatures. (M26, Q3, SS)

349-M. (Spanish.) **New Possibilities of Macro and Microphotography in Welding Investigation.** Felipe A. Calvo. *Ciencia y Téchnica de la Soldadura,* v. 1, Nov.-Dec. 1951, 6 pages.

Methods using both oblique and reflected illumination. (M21)

350-M. Effect of Cr on Eutectoid Carbon. H. S. Blumberg. *Metal Progress*, v. 62, Aug. 1952, p. 93.

Proposes a simple empirical formula which approximates the values reported by various investigators. Calculated results from this formula and data shown by various authorities are tabulated. (M27, AY, SS)

351-M. Discard This Etchant Promptly. L. H. Satz. *Metal Progress*, v. 62, Aug. 1952, p. 96.

Recommends discarding of the "mixed acids in glycerol' etchant of stainless steels soon after preparation. On standing for extended periods a dangerous exothermic reaction takes place. (M21, SS)

352-M. Ni-Cr-Fe Ternary Diagrams. *Metal Progress*, v. 62, Aug. 1952, p. 96-B.

Data sheet. Diagrams for six temperatures. (M24, Ni, Cr, Fe)

353-M. (English.) **Compounds of Thorium With Transition Metals. I. The Thorium-Manganese System.** John V. Florio, R. E. Rundle, and A. I. Snow. *Acta Crystallographica*, v. 5, July 1952, p. 449-457.

Previously abstracted from *U. S. Atomic Energy Commission*, AECD-3249, Aug. 24, 1951. See item 65-M, 1952. (M24, Th, Mn)

354-M. (Book) **Imperfections in Nearly Perfect Crystals.** W. Shockley, J. H. Hollomon, R. Maurer, and F. Seitz, editors. 490 pages. 1950. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $7.50.

Symposium held at Pocono Manor, Pa., Oct. 12-14, 1950, to present a cross-section of views and findings on imperfect crystals. The important parts of papers and discussions are summarized in 17 chapters, divided into 4 parts: On the Nature of Imperfections in Nearly Perfect Crystals; The Role of Imperfections in Deformation; Diffusion and Related Phenomena; and Properties and Effects of External and Internal Surfaces of Crystals. Selected papers are separately abstracted. (M 26, N general, Q24)

355-M. (Book) **Polarized Light in Metallography.** G. K. T. Conn and F. J. Bradshaw. 130 pages. 1952. Academic Press, Inc., 125 E. 23rd St., New York 10, N. Y. $3.80.

First part deals with optical principles, equipment and procedure. Second part gives many examples of the uses to which the technique has been put. Alloy phase identification, orientation studies, and ore and inclusion analysis. (M21)

356-M. (Book) **Steel Defects and Their Detection.** Henry Thompson. 84 pages. 1952. Sir Isaac Pitman & Sons, Ltd., 39 Parker St., Kingsway, London W.C. 2, England. 15s.

The first three chapters deal briefly with steel ingots and the more common defects associated with ingots and the rolling processes. Two chapters give details of macroscopic and microscopic tests. Hints on the preparation of micro-specimens, and a list of special etching reagents. Special tests such as nondestructive methods of flaw detection, sorting of mixed steels, and the McQuaid-Ehn grain-size test. (M27, M28, S10, S13, ST)

357-M. Quantitative Metallography With the Electron Microscope. Alfred L. Ellis and F. K. Iverson. *ASTM Bulletin*, July 1952, p. 66-69.

Principles and special problems involved in application of the electron microscope. It can be used advantageously when the particle size is very small. Representative sampling and reproducibility. Results are compared with those obtained by other methods. (M21)

358-M. The Use of Polarized Light for the Examination of Etched Metal Crystals and Their Orientation. P. Dunsmuir. *British Journal of Applied Physics*, v. 3, Aug. 1952, p. 264-267.

The practical case of examining cold rolled Si-Fe alloys for preferred orientation. Diagrams and macrographs. (M21, Fe)

359-M. The Thorium-Selenium System. R. W. M. D'Eye, P. G. Sellman, and J. R. Murray. *Journal of the Chemical Society*, July 1952, p. 2555-2562.

Thermal, metallographic, X-ray, and chemical analysis have unambiguously identified four phases: ThSe, Th_2Se_3, Th_7Se_{12}, and $ThSe_2$. Detailed information on lattice parameters and structures. Tables, graphs, and photomicrographs. (M24, Th, Se)

360-M. Microradiography With Alpha-Rays. Gunnar Aniansson and Naftali Steiger. *Nature*, v. 170, Aug. 2, 1952, p. 201-202.

Experiments were undertaken to determine potentialities and optimum conditions. The main advantage of using α-particles as compared with soft X-rays is much simpler apparatus needed and relative independence of absorption on composition of the object. (M23)

361-M. A New Molybdenum Carbide. K. Kuo and G. Hägg. *Nature*, v. 170, Aug. 9, 1952, p. 245-246.

Studies of products formed by carburizing Mo with CO confirmed existence of Mo_2C (β-phase) and MoC

(γ-phase, the latter having the WC structure. In addition a new carbide was found. Describes its transformations and lattice parameters. (M26, Mo, C-n)

362-M. Asymmetry of Texture in Cubic Crystals Grown From the Melt. P. R. Rowland. *Proceedings of the Physical Society,* v. 65, sec. B, Aug. 1, 1952, p. 572-574.

Discussion of electropolishing of single-crystal spheres of Cu grown from melt revealed that they appear to consist of a number of parallel crystallites of square cross section with their lengths parallel to the (001) axis which lies nearest in direction to the "direction of growth" in the melt. (M26, Cu)

363-M. Diffraction by a Semi-Infinite Metallic Sheet. T. B. A. Senior. *Proceedings of the Royal Society,* ser. A, v. 213, July 22, 1952, p. 436-458.

With assumption of suitable boundary conditions, the problem of diffraction at a metal sheet is capable of exact solution. Corresponding to each of two fundamental polarizations, a pair of Wiener-Hopf integral equations is derived from which to determine electric and magnetic currents present in the sheet. One of these equations is subjected to a rigorous solution, and from it the solutions of the other three are deduced by symmetry considerations. Use of the generalized method of steepest descent then serves to determine the diffracted fields. 28 ref. (M22)

364-M. Some Corrections to Cast Iron Diagrams of Maurer and Others. Ichiro Iitaka. *Reports of the Casting Research Laboratory,* No. 3, 1952, p. 1-2.

Indicates corrections deemed necessary. (M24, CI)

365-M. Some Experiments on the Structure Diagram and the Annealing of Spheroidal Graphite Iron. Nobuhisa Tsutsumi. *Reports of the Casting Research Laboratory,* No. 3, 1952, p. 6-10.

Using synthetic iron containing no appreciable amounts of Mn, P, and S impurities, metallographic examinations were made in the as-cast and annealed condition on irons containing 2.4-4.5% C and 0-4.6% Si. Tables, graphs, and micrographs. (M27, J23, CI)

366-M. Spheroidal Graphite Cast Iron. Takaji Kusakawa. *Reports of the Casting Research Laboratory,* No. 3, 1952, p. 11-14.

Effects of Ca on microstructure and mechanical properties were investigated. (M27, Q general, CI)

367-M. Research on Rapid Heating of Steels. Kiyoshi Yokota and Nobuhiro Iguchi. *Reports of the Casting Research Laboratory,* no. 3, 1952, p. 56-58.

Results of dilatometric and micrographic studies on Swedish mild steels. Illustrated. (M21, M23, CN)

368-M. Anisotropic Lattice Distortion. E. C. Williams. *Research,* v. 5, Aug. 1952, p. 392-393.

Calculation. Typical results are charted. (M26)

369-M. General Introduction, the Reciprocal Lattice. J. Bouman. "Selected Topics in X-Ray Crystallography From the Delft X-Ray Institutes". (Interscience Publishers, New York), 1951, p. 3-18.

Mathematics of lattice structure and its analysis. Diagrams. (M26)

370-M. The Retigraph. W. F. de Jong. "Selected Topics in X-Ray Crystallography From the Delft X-Ray Institutes." (Interscience Publishers, New York), 1951, p. 19-31.

The retigraph is a moving-film apparatus which provides an undistorted photograph of a reciprocal lattice plane in contrast to the Weissenberg or Schiebold-Sauter camera. By photographing a number of parallel successive lattice planes and placing these at their appropriate distance and orientation, the complete reciprocal lattice may be obtained. (M22)

371-M. Termination Effects in X-Ray Fourier-Syntheses. L. L. Van Reijen. "Selected Topics in X-Ray Crystallography From the Delft X-Ray Institutes". (Interscience Publishers, New York), 1951, p. 32-58.

Calculation of electron distribution from a set of Fourier coefficients. Errors, accuracy, termination factor, converging factor in 1-dimensional syntheses, elimination of termination effects, extension to 2 and 3-dimensional syntheses, and termination effects for diamond. 30 ref. (M22)

372-M. The Breadth of Debye-Scherrer-Lines, Caused by the Dimensions of the Crystal Particles. J. Bouman. "Selected Topics in X-Ray Crystallography From the Delft X-Ray Institutes". (Interscience Publishers, New York), 1951, p. 59-71.

Mathematical analysis. (M22)

373-M. Calculation of the Stereographic Pole Figure of the Cubic Lattice for Any Given Direction (HKL). W. May. "Selected Topics in X-Ray Crystallography From the Delft X-Ray Institutes". (Interscience Publishers, New York), 1951, p. 72-76.

Procedure. (M23)

374-M. Theoretical Considerations. J. Bouman. "Selected Topics in X-Ray Crystallography From the Delft X-Ray Institutes". (Interscience Publishers, New York), 1951, p. 80-105.

Introductory chapter to series on distortions in crystals. 20 ref. (M26)

375-M. A Simplified Theory of the Diffuse Spots. J. Bouman. "Selected Topics in X-Ray Crystallography From the Delft X-Ray Institutes" (Interscience Publishers, New York), 1951, p. 106-112.

Modification of diffraction by crystals by heat motion is a special case of the general theory of lattice distortions. In this case it is possible to calculate exactly distribution of intensity in reciprocal space. A simplified treatment is given, restricted to a monoatomic lattice and to small displacements. (M22, M26)

376-M. The Diffuse Pattern of Tin Single Crystals. J. J. Arlman and J. Bouman. "Selected Topics in X-Ray Crystallography From the Delft X-Ray Institutes". (Interscience Publishers, New York), 1951, p. 113-135.

Results of experiments. 18 ref. (M26, Sn)

377-M. Lattice Distortions in Sheared Aluminium Single Crystals. W. G. Burgers and F. J. Lebbink. "Selected Topics in X-Ray Crystallography From the Delft X-Ray Institutes". (Interscience Publishers, New York). 1951, p. 146-158.

In not too severely deformed single crystals, plastic deformation is indicated by elongation of the Laue interference spots (so-called "asterism"), pointing to the occurrence of curved or broken-up lattice domains, which may have either a local character or spread over areas of larger size. Experiments on this type of diffraction phenomena. Al single crystals were subjected to careful deformation by "pure shearing" and the occurrence of asterism in the Laue photographs of the deformed crystals was analyzed and interpreted in connection with the supposed mechanism of the shearing process. 29 ref. (M22, M26, Q24, Al)

378-M. (French.) **Present State of the Metallography of Alloyed Austenites, Particularly in 18-8 Steel.** P. Bastien and J. Dedieu, *Métaux: Corrosion—Industries,* v. 27, June 1952, p. 237-244.

Influence of allotropy of iron, role of carbon, the carbides, the eutectoid composition, regions of coexistence of alpha, gamma, and carbide phases. Includes schematic drawings and tabular data. 11 ref. (M24, N8, SS)

379-M. (German.) **The Iron-Iron Phosphide-Aluminum Phosphide-Aluminum Phase Diagram.** Rudolf Vogel and Helmut Klose. *Archiv für das Eisenhüttenwesen,* v. 23, July-Aug. 1952, p. 287-291.

Experimental and theoretical details of investigation, done in the Fe corner, on the basis of thermal and structural investigations. Results are interpreted. Diagrams and micrographs. (M24, Fe, Al)

380-M. (German.) **Copper-Beryllium Alloys, and Their Use in Industry.** W. Deisinger. *Metall,* v. 6, Aug. 1952, p. 436-440.

The binary Cu-Be system, and applications of Be-Cu alloys (Cu-base). Mechanical properties are charted. Micrographs illustrate typical structures. (M24, Q general, Cu)

381-M. (German.) **New Precision Cameras for X-Ray Investigation of Microstructures.** G. Freyer and Th. Lohmann. *Technik,* v. 7, Mar. 1952, p. 122-124.

New camera designs. Typical results. (M21)

382-M. Microconstituents in High Temperature Alloys. H. J. Beattie, Jr., and F. L. VerSnyder. *American Society for Metals,* Preprint 1, 1952, 27 pages.

By use of microstructural studies and X-ray diffraction analysis of electrolytically separated residues, the microconstituents of Fe, Co, and Ni-base high-temperature alloys were studied. Results show some of the effects of Te and Mo as alloying additions. Occurrence and suggested mode of formation of titanium carbonitride in a Ni-base age-hardenable alloy were determined. Conclusions applicable to most air-melted Te-containing alloys. The intermetallic compounds M_2Ti and Fe_2Al were identified. The second Brillouin zone is considered for the complex carbides M_6C and $M_{23}C_6$, with resulting determination of ratio of electron to metal atom capacity of about 7:1. 13 ref. (M27, Fe, Co, Ni)

383-M. Sigma Formation and Its Effect on the Impact Properties of Iron-Nickel-Chromium Alloys. A. M. Talbot and D. E. Furman. *American Society for Metals,* Preprint 2, 1952, 12 pages.

Approximate σ-phase boundaries between 1200 and 1650° F. were located by metallographic means for Fe-Ni-Cr alloys of relatively high alloy content and of simulated commercial quality. For conditions approaching equilibrium, the limiting σ-boundary was found to extend from about 21% Cr at 20% Ni to

24% Cr at 35% Ni. Effectiveness of Si in moving the sigma area to lower Cr contents. (M24, Q6, Fe, Ni, Cr)

384-M. The Titanium-Oxygen System. E. S. Bumps, H. D. Kessler, and M. Hansen. *American Society for Metals,* Preprint 32, 1952, 18 pages.

Details of partial phase diagram based principally on results of micrographic analysis of arc-melted alloys containing up to 30% O_2. Lattice-parameter measurements for both the α and TiO phases, and hardness-test results for alloys containing up to 30% O_2. Tables, graphs, and photomicrographs. 15 ref. (M24, Q29, Ti)

385-M. The System Zirconium-Tin. D. J. McPherson and M. Hansen. *American Society for Metals,* Preprint 34, 1952, 17 pages.

Zr-Sn alloys were prepared and heat treated under protective conditions. The phase diagram was established, based on micrographic and X-ray diffraction analysis, metallographic detection of incipient melting, and thermal analysis. Tables, graphs, and photomicrographs. (M24, Zr, Sn)

386-M. The Indium-Arsenic System. T. S. Liu and E. A. Peretti. *American Society for Metals,* Preprint 40, 1952, 9 pages.

Investigated by thermal, X-ray, and metallographic methods. Existence of an intermediate phase corresponding closely to the composition InAs was confirmed. (M24, In, As)

387-M. The System Zirconium-Silicon. C. E. Lundin, D. J. McPherson, and M. Hansen. *American Society for Metals,* Preprint 41, 1952, 14 pages.

Phase diagram was determined, with particular emphasis on the Zr-rich portion. The principal methods used were metallography of cast and heat treated specimens, detection of incipient melting, thermal analysis, and X-ray diffraction analysis. (M24, Zr, Si)

388-M. Titanium Metallography — Simple, Safe. *Iron Age,* v. 170, Aug. 28, 1952, p. 112.

Step-by-step description. (M21, Ti)

389-M. X-Ray Diffraction by Face-Centered Cubic Crystals With Deformation Faults. M. S. Paterson. *Journal of Applied Physics,* v. 23, Aug. 1952, p. 805-811.

Results of a calculation for face-centered cubic crystals in which the faults occur in (111) planes; detailed intensity distribution in the reciprocal lattice, the positions of the intensity maxima and their breadths, and other results expressed in terms of the density of faulting. 13 ref. (M22, M26)

390-M. The Metallography of Uranium. B. W. Mott and H. R. Haines. *Journal of the Institute of Metals,* v. 80, Aug. 1952, p. 621-627.

Methods of preparing U for examination under polarized light, and relative merits of various solutions for electrolytic polishing. Structures observed on sections taken from material in cast, swaged, and hot worked conditions; effects of heat treatment and recrystallization. Future developments. 22 ref. (M21, M27, U)

391-M. The Application of Polarized Light to the Examination of Various Anisotropic Metals and Intermetallic Phases. B. W. Mott and H. R. Haines. *Journal of the Institute of Metals,* v. 80, Aug. 1952, p. 629-636.

Details include methods of preparation of Sb, Be, Bi, Cd, Co, Mg, Sn, Ti, U, Zn, Zr, and of the alloys MgU, ThAl, ThSe, WC, and UAl. 50 ref. (M21)

392-M. The Equilibrium Diagram of the System Copper-Indium in the Region 25-35 At. % Indium. J. Reynolds, W. A. Wiseman, and W. Hume-Rothery. *Journal of the Institute of Metals,* v. 80, Aug. 1952, p. 637-640.

Determination by thermal, microscopic, and X-ray methods. Diagrams and tables. (M24, In, Cu)

393-M. The Constitution and Structure of Nickel-Vanadium Alloys in the Region 0-60 At. % Vanadium. W. B. Pearson and W. Hume-Rothery. *Journal of the Institute of Metals,* v. 80, Aug. 1952, p. 641-652.

Investigated by thermal, microscopic, and X-ray method. The θ phase is of variable composition, and its crystal structure has been determined. Effects of composition on the lattice spacings of the α, θ, and σ phases were studied; bearing of the results on the general theory of alloys. Diagrams and graphs. (M24, Ni, V)

394-M. The Constitution of Iron-Nickel-Chromium Alloys at 550-800° C. A. J. Cook and B. R. Brown. *Journal of the Iron and Steel Institute,* v. 171, Aug. 1952, p. 345-353.

Results obtained from metallographic and X-ray examination (including lattice-parameter measurements) of a series of high-purity Fe-Ni-Cr alloys in an attempt to establish the equilibrium constitution at 550° C. with particular reference to the development of sigma phase in the alloy system. The alloys investigated contained 0-40% Ni and 0-35% Cr. Tables, phase dia-

grams, and micrographs.
(M24, Fe, Ni, Cr)

395-M. Observations on the Lattice Parameters of the Alpha and TiO Phases in the Titanium-Oxygen System. W. Rostoker. *Journal of Metals,* v. 4, Sept. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 981-982.
Graphs. 14 ref. (M26, Ti)

396-M. System Molybdenum-Boron and Some Properties of the Molybdenum Borides. Robert Steinitz, Ira Binder, and David Moskowitz. *Journal of Metals,* v. 4, Sept. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 983-987.
Discussed in relation to raw materials and preparation, experimental procedures, room-temperature phases, and structures and properties of Mo borides. The system was studied from 0 to 25% B. Structural, physical, mechanical and oxidation-resistant properties were determined. Diagrams, graphs, and tables. 14 ref.
(M24, P general, Q general, R2, Mo)

397-M. Note on the Effect of Oxygen and Nitrogen on the Hardness and Lattice Parameter of High Purity Vanadium. S. Beatty. *Journal of Metals,* v. 4, Sept. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 987-988.
Procedure and results.
(M26, Q29, V)

398-M. An Automatic Thermal Analysis Recorder. R. L. Cunningham and W. P. Campbell. *Journal of Scientific Instruments,* v. 29, Aug. 1952, p. 252-253.
An inverse-rate recorder which can detect thermal effects to within 0.2° C. Position of each line represents a set temperature, while length of the line represents time required for the sample to change from the previous temperature. (M23)

399-M. A Simple Method of Determining Orientation in Recrystallized Wires of the Cubic System. T. S. Hutchison. *Journal of Scientific Instruments,* v. 29, Aug. 1952, p. 257-258.
The method is used where the grain size is greater than 10^{-2} cm. Standard physics laboratory equipment is used. (M26)

400-M. A Simple Method of Determining the Azimuthal Orientation of Single Crystals With the Weissenberg Goniometer. D. S. Beard. *Journal of Scientific Instruments,* v. 29, Aug. 1952, p. 268.
Application in which only recognition of a principal row of lattice points is required. (M26)

401-M. Nature of Bainite. *Metal Progress,* v. 62, Sept. 1952, p. 124. (Condensed from "Report of Committee E-4 on Metallography", *American Society for Testing Materials,* Preprint 53, 1952.)
Previously abstracted from original; see item 267-M, 1952. (M27, ST)

402-M. Thermal Etching of Iron and Steel. M. J. Olney. *Metal Treatment and Drop Forging,* v. 19, Aug. 1952, p. 347-354.
Survey of literature with special reference to the theoretical aspects. Experimental results obtained by heating and cooling polished steel specimens "in vacuo". Photomicrographs. 27 ref. (M21, Fe, ST)

403-M. Aligning Single Crystals for X-Ray Diffraction. L. S. Birks and A. B. Wing. *Review of Scientific Instruments,* v. 23, Aug. 1952, p. 442-443.
A step-by-step procedure for optical alignment of single crystals. Such alignment eliminates the necessity of the preliminary photograph for determining the final settings of the goniometer arcs in the Weissenberg or precession techniques. (M22)

404-M. (French.) **Wire-Form Anticathodes: Application to X-Ray Diffraction by Crystals.** Jean Barraud and Claire Pierrée. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 235, July 7, 1952, p. 72-74.
Wire-form anticathodes were used for obtaining Laue diagrams of various crystal structures. Advantages of the method. (M22)

405-M. (German.) **How to Embed Microsections in Casting Resin.** Cord Peterson. *Zeitschrift für Metallkunde,* v. 43, July 1952, p. 250-251.
Diagrams and describes suitable method. (M21)

406-M. (German.) **Structure of the Copper-Germanium System.** Konrad Schubert and Gundolf Brandauer. *Zeitschrift für Metallkunde,* v. 43, July 1952, p. 262-268.
Reports on high-temperature X-ray investigations of the above system. Their structures are interpreted. Data are tabulated and charted. 34 ref. (M24, M27, Cu, Ge)

407-M. (Russian.) **Saturation of the Surface of Steel by Tungsten From Gaseous Media.** G. N. Dubinin. *Doklady Akademii Nauk SSSR,* new ser., v. 84, June 1, 1952, p. 693-696.
Iron and steel (0.1-1.2% C) specimens were used in the investigation. Data are tabulated, charted, and illustrated. Includes W-Fe diagram. (M24, N1, W, ST)

408-M. (Russian.) **New Phases in the Aluminium - Germanium - Sodium and Aluminum - Germanium - Lithium Systems.** E. A. Boom. *Doklady Akademii Nauk SSSR,* new ser., v. 84, June 1, 1952, p. 697-699.

Results of a microscopic study. (M24, Al, Ge, Na, Li)

409-M. (Russian.) **Rounding of Obstacles by the Front of a Growing Layer of a Crystal Face.** G. G. Lemmlein. *Doklady Akademii Nauk SSSR,* new ser., v. 84, June 21, 1952, p. 1167-1169.

A microscopic study was made of the growth of thin layers (spiral or plane) of SiC crystals around obstacles. (M26, Si, C-n)

410-M. (Russian.) **Crystal Structure of the Ternary Phase Cu_4MgSn.** E. I. Gladyshevskii, P. I. Kripiakevich, and M. Iu. Tesliuk. *Doklady Akademii Nauk SSSR,* new ser., v. 85, July 1, 1952, p. 81-84.

X-ray, thermal, and microscopic investigations on the above system. Data are tabulated. (M26, Cu, Mg, Sn)

411-M. (French.) **Dilatometric Study of Metallic Dysprosium.** Félix Trombe and Marc Föex. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 235, July 16, 1952, p. 163-165.

Results of investigation, in the region −195 to +300° C., charted and compared with those previously reported for gadolinium. (M23, Dy)

412-M. (French.) **Evidence of the Heterogeneity of a Solid Solution in Equilibrium.** Christopher B. Walker, Jean Blin, and André Guinier. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 235, July 21, 1952, p. 254-255.

Redistribution of the atoms in a solid solution, where the atoms have a tendency to separate, was investigated by means of X-ray diffraction. Results for an Al alloy containing 20°% Ag. (M26, N12, Al)

413-M. (French.) **Micrographic Coloring Reagents for Iron and Steels.** L. Beaujard. *Revue de Métallurgie,* v. 49, July 1952, p. 531-538.

Use of various reagents for studying the structure of surface layers. Use and results with sodium bichromate, sodium nitrate, and sodium nitrite. Micrographs. (M21)

414-M. (German.) **Research on Surface Structures With the Aid of Adsorption and Catalysis.** E. Cremer. *Zeitschrift fur Elektrochemie; Berichte der Bunsengesellschaft fur Physikalische Chemie,* v. 56, No. 5, 1952, p. 439-446; disc., p. 446.

Theoretical and experimental discussion shows that catalytic reactions, adsorption isotherms, and the adhesiveness of powders are valuable aids to the study of surface structures of metallic and nonmetallic materials. Graphs, tables, and diagrams. 43 ref. (M23)

415-M. (German.) **Formation of Nuclei and Orientation of Materials Deposited on Different Types of Crystalline Substances.** A. Neuhaus. *Zeitschrift für Elektrochemie; Berichte der Bunsengesellschaft für Physikalische Chemie,* v. 56, No. 5, 1952, p. 453-458.

Review of recent methods and results. Experimental results obtained by the high vacuum process and their importance to the kinetics of reactions and molecular energy. Inorganic salts, organic compounds, and silver were deposited on nonmetallic bases. Photomicrographs and tables. 23 ref. (M26, Ag)

416-M. (Italian.) **Contribution to Investigation of the Cr_2O_3-FeO-SiO_2 System.** Raffaello Zoja. *Metallurgia Italiana,* v. 44, July 1952, p. 247-249.

Special difficulties encountered in investigation of this type of system. Procedures developed to overcome them. By these means position of the three binary eutectics and of the ternary eutectic was determined rather approximately. (M24, SS)

417-M. (Swedish.) **X-Ray Analysis of Carbides in Tungsten Steel.** Kehsin Kuo. *Jernkontorets Annaler,* v. 136, No. 6, 1952, p. 156-168.

Results of experimental investigation of phases existing at different temperatures and their transformations. Tables and X-ray patterns. 17 ref. (M26, TS, C-n)

418-M. (Book.) **Selected Topics in X-Ray Crystallography From the Delft X-Ray Institutes.** J. Bouman, editor. 375 pages. 1951. North-Holland Publishing Co., Amsterdam; and Interscience Publishers, 250 5th Ave., New York. (Monographs on Theoretical and Applied Physics, Vol. III.) $11.00.

Consists of 25 chapters classifed in 8 sections: general methods of structure analysis, crystal distortions; recrystallization of Al; photographic emulsions and silver halide crystals; amorphous states of Hg, Sb, Se, and S; quantitative structure determinations; crystallinity of natural rubber; and biological investigations. Selected reports of metallurgical or general interest are separately abstracted. (M26)

419-M. **Plastic Deformation Features on Cleavage Surfaces of Metal Crystals.** J. Holden. *Philosophical Magazine,* ser. 7, v. 43, Sept. 1952, p. 976-984.

Surface measurements were made

on kink bands, twin bands, and bend planes produced in specimens cleaved from single crystals of Zn, Mg, Bi, and Sb. Microscopic structure of kink bands and polygonization structures produced by inhomogeneous deformation followed by annealing are illustrated.
(Q24, Zn, Bi, Mg, Sb)

420-M. (German.) **Structure of Amorphous Selenium.** H. Richter, W. Kulcke, and H. Specht. *Zeitschrift für Naturforschung,* v. 7a, Aug. 1952, p. 511-532.

Procedure for preparing and X-raying amorphous selenium. Heating was found to convert it directly but partially into crystalline Se. Diagrams, graphs, tables, photographs, and X-ray pictures. 35 ref. (M26, Se)

421-M. (Japanese.) **Kossel Pattern Produced by the Capillary X-Ray Tube and Its Application.** Tohoru Imura. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 16, Jan. 1952, p. 10-15.

Using a new type of capillary X-ray tube, characteristic diffraction patterns were obtained for a single-crystal Al plate, using both transmission and reflection and Cu-*Kα* radiation. Lattice dimensions were determined very accurately.
(M22. Al)

422-M. (Japanese.) **Abnormal Structure in Alloys of the Eutectic or Eutectoid Type. IV. Abnormal Structure of the Ternary Eutectic. Appendix. The Eutectic or Eutectoid Structure.** Kyuya Nagasaki. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 16, Jan. 1952, p. 23-26.

A theoretical analysis, confirmed by results of experiments on a Cd-Bi-Sn alloy. Graphs and photomicrographs. (M27, Cd, Bi, Sn)

423-M. Markings Found in the Oxide Replicas for Electron Microscopy. Shiegeto Yamaguchi. *Journal of Applied Physics,* v. 23, Sept. 1952, p. 935-936.

Experimental results from literature. Two types of crystal edges are found in electron micrographs of oxide replicas of metals. Mentions Fe, Al, Permalloy, and steels.
(M21, Al, Fe, Ni, ST)

424-M. On the Metallic Shadow-Casting Using a Nozzle System. Tadatosi Hibi. *Journal of Applied Physics,* v. 23, Sept. 1952, p. 957-963.

Previously abstracted from *Review of Scientific Instruments;* see item 332-M, 1952. (M23)

425-M. The Effect of Accelerating Voltage and Specimen Morphology on Electron Diffraction Patterns. S. G. Ellis. *Journal of Applied Physics,* v. 23, Sept. 1952, p. 1024-1028.

Using empirical relations established in study of electron diffraction patterns of uniform thin films of aluminum, contrast between the most intense ring and background is calculated for other morphologies as a function of accelerating voltage on the camera. (M22, Al)

426-M. Phase Equilibrium Investigation of the Na_2O-P_2O_5-SiO_2 Ternary System. E. T. Turkdogan. *Journal of the Iron and Steel Institute,* v. 172, Sept. 1952, p. 1-15.

Part of an investigation of phase distribution in sodium oxide-bearing slags. Systems established by thermal analysis, specific gravity, and microscopic and X-ray determination. Binary and ternary phase-equilibrium diagrams produced are conclusions of present investigation. Tables, photomicrographs, and numerous diagrams. (M24, B21)

427-M. Identification of Certain Iron-Silicon Carbides. W. S. Owen and B. G. Street. *Journal of the Iron and Steel Institute,* v. 172, Sept. 1952, p. 15-18.

X-ray diffraction and microscopic work designed to obtain further information about supposed Fe-Si carbides. Variously prepared Fe-C-Si alloys were used. Photomicrographs and tables. 10 ref.
(M21, M22, Fe, C-n)

428-M. Tungsten-Cobalt-Carbon System. Pekka Rautala and John T. Norton. *Journal of Metals,* v. 4, Oct. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 1045-1050.

The phases and equilibria in the W-Co-C system were studied by X-ray diffraction methods, metallographic techniques, and thermal analysis. Reactions leading to different phases were explained and tentative diagrams of stable and metastable equilibria proposed. Basic reactions in sintering. Graphs and diagram.
(M24, W, Co)

429-M. Role of the Binder Phase in Cemented Tungsten Carbide-Cobalt Alloys. Joseph Gurland and John T. Norton. *Journal of Metals,* v. 4, Oct. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 1051-1056.

Experiments to determine whether sintering of tungsten carbide-cobalt alloys leads to formation of a carbide skeleton or whether densification behavior and properties of cemented compacts are consistent with a structure of isolated carbide grains, in a matrix of binder metal. Graphs and micrographs. 15 ref.
(M27, H15, W, C-n, Co)

430-M. Intermediate Phases in the Mo-Fe-Co, Mo-Fe-Ni, and Mo-Ni-Co Ternary Systems. D. K. Das, S. P. Rideout, and Paul A. Beck. *Journal of Metals,* v. 4, Oct. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 1071-1075.

Investigation concerned with the 1200° C. isothermal sections of above ternary systems. Diagrams and micrographs. 23 ref. (M24, Mo, Fe, Ni, Co)

431-M. Copper-Zinc Constitution Diagram, Redetermined in the Vicinity of the Beta Phase by Means of Quantitative Metallography. Lilian Heikkinen Beck and Cyril Stanley Smith. *Journal of Metals,* v. 4, Oct. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 1079-1083.

By quantitative microscopic measurement of areas of each constituent in well-annealed 2-phase alloys, and by precise measurement of lattice parameters, $\alpha + \beta$ and $\beta + \gamma$ fields were redetermined down to temperatures of 250° C. Tables and diagrams. (M24, Cu, Zn)

432-M. Laue Asterism and Deformation Bands. E. A. Calnan. *Acta Crystallographica,* v. 5, Sept. 10, 1952, p. 557-563.

Nature of lamellar regions in relation to current ideas on inhomogeneous deformation. Experimental data using Al crystals. Micrographs, diffraction patterns and tables. 24 ref. (M22, Al)

433-M. The Use of the Three-Stage Electron Microscope in Crystal-Structure Analysis. J. F. Brown and D. Clark. *Acta Crystallographica,* v. 5, Sept. 10, 1952, p. 615-619.

Application of electron diffraction to unsolved structure problems, particularly in those cases where X-ray methods by themselves have failed. Two examples show how these single-crystal diffraction patterns can be used to obtain valuable crystallographic information concerning unit-cell size and symmetry. The work is carried out on σ phase and carbide residues obtained from stainless steels. Photomicrographs and tables. 14 ref. (M26)

434-M. The Interpretation of Diffuse X-Ray Reflections From Single Crystals. J. Hoerni and W. A. Wooster. *Acta Crystallographica,* v. 5, Sept. 10, 1952, p. 626-630.

Construction and use of charts whereby angular coordinates of any line in reciprocal space passing through a reciprocal point near to the sphere of reflection can be found, and giving distance from same reciprocal point of intersection of this line with the reflecting sphere. Methods for using Laue and Bragg reflections to locate the charts correctly with respect to an enlarged drawing of the diffuse spot. (M22)

435-M. Interatomic Distances and Atomic Valences in $NaZn_{13}$. David P. Shoemaker, Richard E. Marsh, Fred J. Ewing, and Linus Pauling. *Acta Crystallographica,* v. 5, Sept. 10, 1952, p. 637-644.

Theoretical study undertaken to provide unit-cell and positional parameters and interatomic distances with sufficient precision for a satisfactory interpretation of above structure in terms of atomic valence and bond numbers. (M25, Zn)

436-M. Crystal Chemical Studies of the 5f-Series of Elements. XVII. The Crystal Structure of Neptunium Metal. XVIII. Crystal Structure Studies of Neptunium Metal at Elevated Temperatures. W. H. Zachariasen. *Acta Crystallographica,* v. 5, Sept. 10, 1952, p. 660-667.

Part XVII: Crystal structure of neptunium metal at room temperature. Part XVIII: Crystal structure studies in range from room temperature to melting point, which is at 640° C. Tables. (M26, Np)

437-M. Fourier Strips at a 3° Interval. C. A. Beevers. *Acta Crystallographica,* v. 5, Sept. 10, 1952, p. 670-673.

Production of a new set of Fourier strips to an interval of 3°. Author believes this set will be of considerable service in structure-factor calculation as well as in computation of electron-density and Patterson maps, and in calculation of molecular Fourier transforms. 11 ref. (M22)

438-M. The Use of Fourier Strips for Calculating Structure Factors. C. A. Beevers and H. Lipson. *Acta Crystallographica,* v. 5, Sept. 10, 1952, p. 673-675.

Accuracy of the method and some examples of procedure involved. Tables. (M22)

439-M. Crystal Gazing With X-Rays. *Chemical and Engineering News,* v. 30, Oct. 20, 1952, p. 4356-4363.

History, theory, and equipment used in determining structures of crystals. Fourier synthesis and Patterson analysis. Photographs and diagrams. (M26)

440-M. Electron Diffraction and Grinding of Metals. R. Courtel. *Industrial Diamond Review,* new ser., v. 12, Sept. 1952, p. 196-200. (Translated and condensed from *Metaux et Corrosion,* v. 25, May 1950, p. 117-125; June 1950, p. 145-155; July-Aug. 1950, p. 188-199.)

Previously abstracted from original under slightly different titles. See items 280-M and 159-C, 1950. (M22, E25, C25)

441-M. The Constitution of Nickel-Rich Alloys of the Nickel-Titanium-Aluminium System. A. Taylor and R. W. Floyd. *Journal of the Institute of Metals,* v. 81, Sept. 1952, p. 25-32.

Equilibrium relationships of the above over the range 750-1150° C. were determined by a combination of micrographic and X-ray-diffraction techniques. Tables, phase diagrams, and photomicrographs. (M24, Ni, Al, Ti)

442-M. Distribution Equilibria in Some Ternary Systems Me_1-Me_2-B and the Relative Strength of the Transition-Metal-Boron Bond. G. Hägg and R. Kiessling. *Journal of the Institute of Metals,* v. 81, Sept. 1952, p. 57-60.

In ternary systems Me_1-Me_2-B, where Me_1 and Me_2 both belong to 1st series of transition metals, distribution of metals between 2 phases $(Me_1, Me_2)_2B$ and $(Me_1, Me_2)B$ in equilibrium with each other has been determined by X-ray methods. Metal with lower atomic number is always concentrated in phase richest in boron. Tables and phase diagrams. (M24)

443-M. Identification of Fractures in Cast Magnesium Alloys. P. F. George and H. A. Diehl. *Metal Progress,* v. 62, Oct. 1952, p. 96-B, 121-122.

Use of visual, macro, and micro-examination to identify fracture types. (M27, M28, Q26, Mg)

444-M. (Book.) **Atomic Theory for Students of Metallurgy. Ed. 2.** William Hume-Rothery. 331 pages. 1952. Institute of Metals, 4 Grosvenor Gardens, London S.W.7, England. $3.00.

Chapters are grouped under the following headings: The general background; the structure of the free atom; assemblies of atoms; the free-electron theory of metals; the Brillouin-zone theory of metals; and electrons, atoms, metals, and alloys. (M25)

445-M. (Book.) **Fundamentals of Physical Metallurgy.** Ralph Hultgren. 395 pages. Prentice-Hall, Inc., 70 Fifth Ave., New York 11, N. Y. $9.35.

Explains phase reactions predicted from phase diagrams. Effects of microstructure on mechanical properties of alloys. Modern theory of martensite formation, dislocation theory, future of titanium, laws of metallic crystal chemistry, deformation, and recrystallization. (M24, M26, M27, N8, N5, Q24)

446-M. (Book.) **X-Ray Analysis of Crystals.** J. M. Bijvoet, A. H. Kolkmeyer and C. H. MacGillavry. 304 pages. 1951. Butterworths Scientific Publications, 4-6 Bell Yard, Temple Bar, London W.C.2, England. 50s.

General aspects. Nine appendices. (M26, M22)

447-M. (Book.) (German.) **Atlas Metallographicus. Band 3. Teil 2. Ternäre Legierungen des Aluminiums; Beispiele für die Kristallisation Ternärer Systeme.** (Metallographic Atlas. Vol. 3. Part 2. Ternary Alloys of Aluminum; Examples of the Crystallization of Ternary Systems.) Heinrich Hanemann and Angelica Schrader. 170 pages. 1952. Verlag Stahleisen M.B.H., Breite Strasse 27, Postschliessfach 2590, Dusseldorf, Germany. 80 DM.

A comprehensive reference work covering work done on more than 3000 alloys. 502 illus. (M24, Al)

448-M. Electron Microscope Studies of Evaporated Cadmium and Zinc. R. S. Senett, T. A. McLauchlan, and G. D. Scott. *Canadian Journal of Physics,* v. 30, Sept. 1952, p. 370-372.

Employing a technique whereby evaporations are carried out within the specimen chamber of an electron microscope, continuous observations were made on formation of evaporated deposits of Cd and Zn. Micrographs. (M21, N15, Cd, Zn)

449-M. Further Observations on the Macromosaic Structure of Tin Single Crystals. E. Teghtsoonian and Bruce Chalmers. *Canadian Journal of Physics,* v. 30, Sept. 1952, p. 388-401.

Studies on bands, or striations, into which single crystals of high-purity Sn, grown by a modified Bridgman method, are partitioned. Tables, diagrams, and micrographs. (M26, Sn)

450-M. The Isolation and Examination of Films From Metal Surfaces: An Improved Technique. T. J. Nurse and F. Wormwell. *Journal of Applied Chemistry,* v. 2, Sept. 1952, p. 550-554.

Technique for removal of oxide films from surfaces of mild steel, stainless steel, and nonferrous metals, which entails reinforcement of the film by polyvinylformal. 10 ref. (M23, CN, SS, EG-a)

451-M. A Correlation of Polarized Light Extinctions With Crystal Orientation in 70 Nickel-30 Copper Alloy. H. C. Vacher. *Journal of Research of the National Bureau of Standards,* v. 49, Sept. 1952, p. 149-153.

After etching above alloy to produce an optically anisotropic surface, orientations of 12 crystals were determined by twin-boundary method, and positions of polarized light extinctions (obtained at normal incidence with crossed nicols) were measured. A comparison of orientations with positions of extinctions

was made. Tables, diagrams, and micrographs. 10 ref. (M21, Ni, Cu)

452-M. Magnesium-Rich Side of the Magnesium - Zirconium Constitution Diagram. J. H. Schaum and H. C. Burnett. *Journal of Research of the National Bureau of Standards,* v. 49, Sept. 1952, p. 155-162.

Refinements were made in the diagram developed by previous investigators. Tables, graphs, diagrams, and micrographs. (M24, Mg)

453-M. Lattice Vacancies and Porosity in Copper-Nickel Alloys. E. C. Ellwood. *Nature,* v. 170, Oct. 4, 1952, p. 580-581.

Experimental data. Photomicrographs. (M26, Cu, Ni)

454-M. (French.) **Study by Means of Atomic Pile Irradiation of the Intergranular and Interdendritic Segregation of Traces of Impurities in Very Pure Aluminum.** Frédéric Montariol, Philippe Albert, and Georges Chaudron. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 235, Aug. 18, 1952, p. 477-480.

Weld seams of atomic-pile-irradiated Al specimens were studied, noting the increase in impurities at the grain boundaries. The same phenomenon was also studied by introducing a trace of radioactive Zn into the Al. Includes autoradiographs. (M23, S19, Al)

455-M. (French.) **Evolution at High Temperature of the Micrographic Structure of Refractory Nickel-Chromium Alloys of the 80-20 Type.** J. Poulignier and P. A. Jacquet. *Revue de Métallurgie,* v. 49, Aug. 1952, p. 541-550; disc., p. 551.

Microstructure was studied during heat treatment, tensile testing, and elevated-temperature fatigue testing. The specimens and their preparation; results are interpreted. (M27, Ni)

456-M. (French.) **Graphic Studies of Complex Phenomena.** Jean-Jacques Comhaire. *Revue de Métallurgie,* v. 49, Aug. 1952, p. 561-566.

Proposes a method for preparation of phase diagrams for large numbers of constituents. Various types of presentation, and practical examples. (M24)

457-M. (German.) **The Magnesium-Potassium-Bismuth Ternary System.** Werner Köster and Fritz Sautter. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 5, Aug. 1952, p. 303-307.

The system was investigated on the basis of the Kroll-Betterton process. Regions of primary crystallization, and organization of the concentration surface at room temperature. Diagrams and micrographs. (M24, C26, Mg, Bi)

458-M. (German.) **Contribution to the Tungsten-Silicon System, and the Scale Resistance of Some Silicides.** Richard Kieffer, Friedrich Benesovsky, and Erich Gallistl. *Zeitschrift für Metallkunde,* v. 43, Aug. 1952, p. 284-291.

A review on the basis of the literature. New investigations on the pressure-sintering of tungsten silicides. Proposes a phase diagram of the system on the basis of thermal, microscopic, and radiographic investigations. Mechanism of scaling. Data are tabulated and charted. 33 ref. (M24, R2, W, Si)

459-M. (Russian.) **Dependence of the Quantitative Composition of a Phase on the Ratio of the Atomic Radii for one Class of Intermetallic Phases.** M. A. Styrikovich and Z. L. Miropol'skii. *Doklady Akademii Nauk SSSR,* new ser., v. 85, July 11, 1952, p. 321-324.

The structure of phases of the $MgZn_2$ and $MgCu_2$ type and of the MgZn, W_6Fe_7, and $CaZn_5$ types. Data are tabulated and charted. (M27)

460-M. An Electrolytic Etch Technique for Aluminum and its Application to Some Metallographic Problems. E. C. Pearson, G. Marchand, and R. H. Hay. *Canadian Mining and Metallurgical Bulletin,* v. 45, Oct. 1952, p. 598-604; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 55, 1952, p. 358-364.

A polishing technique, together with two anodic etching methods for Al and its alloys. Optical and structural characteristics of the film formed by these etching methods. To what degree these properties of film are related to crystallographic orientation of metallic substrate. Applications to study of recrystallization and twinning phenomena and to study of plastic deformation, banding, and texture estimation are discussed. Micrographs. (M21, Q24, Al)

461-M. Effect of Internal Strains on Linear Expansion, X-Ray Lattice Constant, and Density of Crystals. P. H. Miller, Jr., and B. R. Russell. *Journal of Applied Physics,* v. 23, Oct. 1952, p. 1163-1169.

General formulas are derived for shift in X-ray diffraction maxima due to small distortions in simple cubic crystals. A comparison is made of lattice constant, linear expansion, and density expected in crystals containing Frenkel defects, Schottky defects, or F centers. 12 ref. (M26, P10)

462-M. The Constitution of Tantalum-Titanium Alloys. D. Summers-Smith. *Journal of the Institute of Metals,* v. 81, Oct. 1952, p. 73-76.

Ta-Ti system was investigated by metallographic and X-ray methods, using alloys prepared from Van Arkel Ti and spectrographic-standard Ta. A continuous series of solid solutions is formed between Ta and β-Ti above 885° C.; at 650° C. the solid solution is limited to 70 at.% Ti. Solubility of Ta in α-titanium is estimated as less than 0.5 at.% at 700° C. Micrographs and graphs. (M24, Ti, Ta)

463-M. An Aid for Making Stereographic Plots When Working With Cubic Crystals. Colman Goldberg. *Journal of Metals,* v. 4, Nov. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 1160-1161.

Tabulated information. (M26)

464-M. An Investigation of Equilibrium Diagram of Fe-As-C System. Hiroshi Sawamura and Toshisada Mori. *Memoirs of the Faculty of Engineering, Kyoto University,* v. 14, July 1952, p. 129-144.

200 specimens of Armco iron, Swedish steel, and Kenjiho white iron were used to determine the Fe-As and Fe-As-C equilibrium diagrams. Dilatometric and microscopic studies were used to determine the influence of As on properties of steel. Tables, micrographs, and graphs. (M24, Fe, CN, CI)

465-M. (German.) **Metallographic and X-Ray Studies of Cold Worked and Fatigue-Stressed Soft Iron.** Hans-Rolf Sander and Max Hempel. *Archiv für das Eisenhüttenwesen,* v. 23, Sept.-Oct. 1952, p. 383-405.

Effects of cold working and fatigue stressing on structures and crystalline states of soft iron before and after annealing at different temperatures. Photomicrographs, graphs, tables, diagrams, and X-ray pictures. 20 ref. (M26, M27, Fe)

466-M. (German.) **A Contribution to the Nickel-Zinc System.** Franz Lihl. *Zeitschrift für Metallkunde,* v. 43, Sept. 1952, p. 310-312.

Hardening tests on sintered Ni-Zn alloys indicate that the solubility limit of α solid solution is at a far higher Ni concentration than indicated by Heike, Schramm, and Vaupel's constitution diagram. X-ray studies show that the solubility of Zn in α solid solution at 300° C. is 7-8 wt. %, at most. Graphs and photomicrographs. (M24, Ni, Zn)

467-M. (German.) **The Homogeneity of Sintered Nickel-Copper Alloys.** Josef Kranz. *Zeitschrift für Metallkunde,* v. 43, Sept. 1952, p. 335-336.

Explains the lack of complete homogeneity of Ni-Cu alloys even after they were subjected to a long homogenizing treatment. Tabulated data and graphs. (M27, H15, Ni, Cu)

468-M. A Study of Segregation in Metals. W. R. Thomas and W. C. Winegard. *Canadian Metals,* v. 15, Oct. 1952, p. 26.

Segregation in single crystals, bicrystals, and polycrystalline specimens of Pb. Autoradiographs. (M27, Pb)

469-M. Magnesium-Cadmium Alloys. IV. The Cadmium-Rich Alloys; Some Lattice Parameters and Phase Relationships Between 25 and 300° Structure of the $MgCd_3$ Superlattice. Schottky Defects and the Anomalous Entropy. Donald A. Edwards, W. E. Wallace, and R. S. Craig. *Journal of the American Chemical Society,* v. 74, Nov. 5, 1952, p. 5256-5261.

Some of the crystallographic characteristics of Cd-rich alloys. Tables. 28 ref. (M26, Mg, Cd)

470-M. Titanium-Chromium Phase Diagram. F. B. Cuff, N. J. Grant, and C. F. Floe. *Journal of Metals,* v. 4, Aug. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 848-853.

Investigation shows presence of a complete series of solid solutions in β-phase, with minimum in the solidus near 50% Cr. An intermetallic compound, $TiCr_2$, forms during cooling from β-solid solution. There is a eutectoid reaction at low-Cr side of system. Phase diagrams and photomicrographs. (M24, Ti, Cr)

471-M. Observations on Twinning in Semicontinuous Cast Aluminum. K. T. Aust, F. M. Krill, and F. R. Morral. *Journal of Metals,* v. 4, Aug. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 865-866.

Illustrated and discussed for 99.2% grade. Structure appears to be formed as a result of uneven cooling stresses within the ingots. Photomicrographs. (M27, C5, Al)

472-M. Electron Diffraction From Small Crystals. Chester R. Berry. *Physical Review,* ser. 2, v. 88, Nov. 1, 1952, p. 596-599.

Ag and AgBr crystals were studied. Diffraction effects were calculated. Graphs. (M22, Ag)

473-M. Aluminum Good Yardstick for Steel Grain Size. John W. Alden and Joseph G. Maravec. *Steel,* v. 131, Nov. 1952, p. 96, 98, 101.

Method for determining austenitic grain sizes by means of spectrographic measurement of residual Al. It was applied to TS-4720 steel. Process takes 2 hr. instead of 2 days required for wet-chemical method. (M23, ST)

474-M. Structure of Crystal Boundaries. B. Chalmers. "Progress in Metal Physics. Vol. 3" (Interscience Publishers, New York), 1952, p. 293-319.

Reviews experimental work reported in the literature, and discusses results and theoretical ideas advanced. Diagrams, graphs, and tables. 38 ref. (M26)

475-M. Recent Advances in the Electron Theory of Metals. N. F. Mott. "Progress in Metal Physics. Vol. 3" (Interscience Publishers, New York), 1952, p. 76-114.

Wave mechanics between a metal and a nonmetal. Magnetic and thermal properties of electrons in metals; metallic cohesion, with reference to transition metals. Elastic constants. Distribution of charge around a dissolved atom and spectroscopy of soft X-rays. Some applications of electron theory to particular kinds of lattice defects. Diagrams, graphs, and tables. 115 ref. (M25, M26, P15)

476-M. Twinning. R. Clark and G. B. Craig. "Progress in Metal Physics, Vol. 3" (Interscience Publishers, New York), 1952, p. 115-139.

Summary of available literature on twinning process in metals dealing with crystallography of twin relationship, conditions under which twins form, and with atom movements involved in twin formation. Metallic examples are Zn, Ag, Cu, Al, Cd, Be, Mg, α-Fe, and β-Sn. Diagrams and tables. 102 ref. (M26, Q24)

477-M. (French.) **Study of the Structure and Properties of the Ferrous Oxide Layer on High-Purity Iron.** R. Collongues and G. Chaudron. *Revue de Métallurgie*, v. 49, Oct. 1952, p. 699-705; disc., p. 705-706.

The study was carried out by means of heat treatments below 570° C. and by electrolytic polishing. Micrographs, 14 ref. (M27, Fe)

478-M. (Book) **Métallographie de l'Aluminium et de ses Alliages: Emploi du Polissage Electrolytique.** (Metallography of Aluminum and Its Alloys: Use of Electrolytic Polishing). P. A. Jacquet. 64 pages. 1952. Office National d'Etudes et de Recherches Aeronautiques, Chatillon-sons-Bagneux (Seine), France. 1200 Fr.

Divided into three parts. First: Bibliography of all references to electrolytic polishing occurring in papers published during 1948-50 inclusive. They are classified under electrolyte used, with title of paper plus a short indication of its scope. Second: Details of new techniques used in metallography; in addition to electropolishing, includes information on chemical brightening processes, use of thin anodic films, etch pits, and preparation of very thin specimens. Third: An automatic machine for electropolishing, examples of its use. Micrographs cover a wide range of alloys, including many with complex intermetallic constituents. (M21, L13, A1)

479-M. (Book.) **Fouriersynthese von Kristallen und ihre Anwendung in der Chemie.** (Fourier Synthesis of Crystals and Its Use in Chemistry). Werner Nowacki. 237 pages. 1952. Verlag Birkhäuser, Basel, Switzerland.

A bibliography precedes each section of this comprehensive treatise. Diagrams, tables, and graphs. (M26)

SECTION N

TRANSFORMATIONS and RESULTING STRUCTURES

1-N. Disintegration of 45-50% Ferro-Silicon and the Generation of Poisonous Gases. A. K. Prestrud. *Journal of the Iron and Steel Institute,* v. 169, Oct. 1951, p. 107-109.

An experiment with ferrosilicon showed an uneven distribution of the different elements in the cast. The analytical figures are compared with data from the Fe-Si equilibrium diagram. Influence of Al on the disintegration of certain grades of ferrosilicon with evolution of phosphine; a cause for the disintegration is suggested. (N12, Fe-n)

2-N. Discussion on the Paper—"The Transformations $\alpha \rightarrow \gamma$ and $\gamma \rightarrow \alpha$ in Iron-Rich Binary Iron-Nickel Alloys," N. P. Allen and C. C. Earley. *Journal of the Iron and Steel Institute,* v. 169, Oct. 1951, p. 127-129.

Paper published in v. 166, Dec. 1950, item 49-N, 1951. (N8, Fe, Ni)

3-N. Joint Discussion on the Papers —"The Acceleration of the Rate of Isothermal Transformation of Austenite"; and "The Breakdown of Austenite Below the M_s Temperature," F. C. Thompson and M. D. Jepson. *Journal of the Iron and Steel Institute,* v. 169, Oct. 1951, p. 129-133.

Papers published in v. 162, 1949, p. 49-56; and v. 164, 1950, p. 27-35. See items 18B-90, 1949, and 31-N, 1950. (N8, ST)

4-N. Discussion on the Atlas of Isothermal Transformation Diagrams of B. S. EN Steels. *Journal of the Iron and Steel Institute,* v. 169, Oct. 1951, p. 137-144.

Deals with *Iron and Steel Institute* (London) Special Report 40, Mar. 1949, item 4B-91. (N8, AY)

5-N. Statement on the Occurrence of Graphitization in Carbon Steel of Stainless-Clad Vessels. *Welding Journal,* v. 30, Nov. 1951, p. 544s-545s.

Graphitization in the service life of vessels for petroleum refineries. Stresses caused by the cladding may be responsible. Aspects of future research. (N8, T29, CN)

6-N. A Theory of Globular Graphite Formation in Cast Iron. Ichiro Iitaka. *Reports of the Casting Research Laboratory,* No. 2, 1951, p. 1-4.

Considering the crystalline nature of graphite on one side, and the process of solidification of cast iron on another side, a hypothesis to explain nodular graphite formation is proposed. The experimental facts hitherto observed by other authors were explained by this hypothesis. 12 ref. (N12, CI)

7-N. Evolving Gases on Solidification of Molten Cast Iron. (Report 2) Minao Nakano. *Reports of the Casting Research Laboratory,* No. 2, 1951, p. 46-49.

Gases evolved during solidification of Penhsihu pig iron melted by various methods were collected and analyzed. The connection between graphitization and compositions of evolved gases was also studied. (N12, E25, CI)

8-N. Fundamental Aspects of Diffusion in Solids. Frederick Seitz. "Phase Transformations in Solids" (John Wiley & Sons, New York), 1951, p. 77-145; disc. p. 146-148.

Emphasis is placed on the theory of the mechanism of diffusion rather than on a detailed compilation of empirical data pertaining to different substances. Theory is applied to metals. 39 ref. (N1)

9-N. Nucleation Theory. R. Smoluchowski. "Phase Transformations in Solids" (John Wiley & Sons, New York), 1951, p. 149-180, disc. p. 180-182.

Considers such aspects as recrystallization, non-equilibrium conditions and fluctuations and embryos in equilibrium conditions. 40 ref. (N2)

10-N. Crystallographic Aspects of Phase Transformations. M. J. Buerger. "Phase Transformations in Solids" (John Wiley & Sons, New York), 1951, p. 183-209; disc. p. 209-211.

Since the structures of many of the crystalline phases involved in transformations are now well known, it is possible to discuss transformations of crystals from a structural viewpoint and to correlate profitably general thermodynamic features with specific structural characteristics. 18 ref. (N6, P12)

11-N. Transformations in Pure Metals. Charles S. Barrett. "Phase Transformations in Solids" (John Wiley & Sons, New York, 1951, p. 343-365.

Some current theories compared with experimental data. Analogies between transformations and related processes. 25 ref. (N6)

12-N. Order-Disorder Transitions in Metal Alloys. Sidney Siegel. "Phase Transformations in Solids" (John Wiley & Sons, New York), 1951, p. 366-383; disc. p. 383-386.

Effects of the order-disorder transition on electrical magnetic, and mechanical properties. 24 ref. (N10, P15, P16, Q general)

13-N. Precipitation From Solid Solutions of Metals. A. H. Geisler. "Phase Transformations in Solids" (John Wiley & Sons, New York), 1951, p. 387-535; disc., p. 536-544.

A comprehensive review of the mechanism of the precipitation process correlated with the changes in properties that occur during aging. The complexities attendant upon the formation of a new phase are rationalized on the basis of changes in crystal structure and in microstructure. 830 ref. (N7)

14-N. The Eutectoid Reaction. Robert F. Mehl and Arthur Dube. "Phase Transformations in Solids" (John Wiley & Sons, New York), 1951, p. 545-582; disc., p. 582-587.

The principles which appear to govern the mechanism and the kinetics of eutectoid reactions. 32 ref. (N8, N9)

15-N. The Martensite Transformation. Morris Cohen. "Phase Transformations in Solids" (John Wiley & Sons, New York), 1951, p. 588-659; disc., p. 659-660.

General characteristics. Crystallographic aspects and the thermodynamics of the reaction. 103 ref. (N8)

16-N. Transformation of Low-Carbon, 12% Chromium Stainless Steels. A. E. Nehrenberg. *Metal Progress,* v. 60, Nov. 1951, p. 64-69.

Quantitative data to show the variation in amount of delta ferrite with temperature in 12.5% Cr stainless steels containing 0.06, 0.10, and 0.12% C. (N8. SS)

17-N. Formation of Annealing Twins During Grain Growth. R. L. Fullman and J. C. Fisher. *Journal of Applied Physics,* v. 22, Nov. 1951, p. 1350-1355.

Proposes that annealing twins form during grain growth as a result of a decrease in the interfacial free energy of grain boundaries that would not occur in the absence of twinning. Experiments designed to permit detection of the changes in grain-boundary free energy accompanying the formation of twins give results in agreement with this concept. The abundance of twins found in annealed Cu depends on the texture in a manner that is consistent with the theory. 11 ref. (N3, Cu)

18-N. Model for Dendrite Growth Form in Metals and Alloys. R. B. Pond and S. W. Kessler. *Journal of Metals,* v. 3, Dec. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1156-1162.

Several pure-metal specimens were solidified through a measured thermal gradient so a free surface and the liquid-solid interface could be examined. A line structure was observed on the surface and a hexagonal structure on the interface. A model to explain these forms is proposed. Metals studied were Pb, Sn, Al, and In.
(N12, Pb, Sn, Al, In)

19-N. Rate of Evaporation of Zinc at Low Pressures. H. W. St. Clair and M. J. Spendlove. *Journal of Metals,* v. 3, Dec. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1192-1197.

Automatic surface-follower mechanism used to measure the surface temperature and rate of evaporation of molten Zn while undergoing distillation at low pressure. At pressures of 50-100 microns Hg, rate of evaporation may be 60-80% of the theoretical maximum corresponding to the measured temperature. The rate decreases rapidly at pressures above 100 microns Hg. Measured temperature gradients at the surface are in agreement with theoretical gradients calculated from heat of vaporization, rate of evaporation, and thermal conductivity of molten Zn. (N16, Zn)

20-N. Eutectoid Decomposition of the Delta Phase of the Copper-Tin System. C. C. Wang and M. Hansen. *Journal of Metals,* v. 3, Dec. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1212.

Longtime annealings at 300° C. were conducted with alloys containing 22, 32.6, and 35% Sn prepared from electrolytic Cu and electrolytic Sn and cast in a small iron mold. Microstructures. (N9, Cu, Sn)

21-N. Hysteresis in Transitions in Solids. D. G. Thomas and L. A. K. Staveley. *Journal of the Chemical Society,* Oct. 1951, p. 2572-2579.

Hysteresis seems to be confined to those cases in which part, at least, of the change occurs almost isothermally. The theory of nucleation proposed by Turnbull is applied to such transitions. Difficulties in quantitative application of the theory, and range in which surface free-energy values would have to fall to account for observed hysteresis effects. The theory is qualitatively used in consideration of factors which affect the width of hysteresis loops and the sharpness with which transitions set in, and also of observed phenomena within the loops. (N2)

22-N. Contamination of Evaporated Films by the Supporting Material of the Source. O. S. Heavens. *Nature,* v. 168, Oct. 13, 1951, p. 664.

Experiments on the above in which an active Ta boat was used as evaporation source. Ag and Ge were examined, the evaporation being carried out at several temperatures. (N16, Ag, Ta, Ge)

23-N. Influence of Polygonization on Certain Properties of Aluminum. (In French.) D. McLean and A. E. L. Tate. *Revue de Métallurgie,* v. 48, Oct. 1951, p. 765-776; disc., p. 776-777.

Influence of polygonization on tensile strength at room temperature and on creep resistance. 14 ref. (N5, Q27, Q3, Al)

24-N. Phenomena in Supersaturated Solid Solutions. (In German.) U. Dehlinger. *Zeitschrift für Naturforschung,* v. 6a, Nov. 1951, p. 718-721.

It is thermodynamically deduced that the diffusion coefficient in supersaturated solid solutions is negative and thus leads to the formation of complexes. Accompanying potential limits and rising temperature reduce the size of the complexes. Applicability to metallic solid solutions. (N1)

25-N. (Book) Phase Transformations in Solids. R. Smoluchowski, J. E. Mayer, and W. A. Weyl, editors. 660 pages. 1951. John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. $9.50.

Papers by various authors divided into three main groups: theoretical physics, nonmetals, and metals. Pertinent ones are separately abstracted. (N general)

26-N. Kinetics of Graphitization in Cast Iron. B. F. Brown and M. F. Hawkes. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 181-198; disc., p. 198-200.

The eutectoid decomposition of austenite to graphite and ferrite and also to pearlite was studied in a Mg-treated nodular iron. A possible mechanism for the effects of alloying elements on rates of graphitization is suggested. (N8, CI)

27-N. Isothermal Transformation Characteristics on Direct Cooling of Alloyed White Iron. F. B. Rote, G. A. Conger, and K. A. DeLonge. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 509-521; disc. p. 521-522.

Previously abstracted from Preprint 9. See item 116-N, 1951. (N8, CI)

28-N. Properties of Alloy Steels for High Temperature Service. II. *Industrial Heating,* v. 18, Dec. 1951, p. 2178, 2180, 2182, 2184.

Condensed version of "Isothermal Transformation, Hardening, and Tempering of 12 Per Cent Chromium Steel", R. L. Rickett, W. F. White, C. S. Walton, and J. C. Butler. Previously abstracted from *American Society for Metals.* Preprint 17, 1951. See item 236-N, 1951. (N8, J26, J29, SS)

29-N. Aging of Al-Cu Alloys. *Metal Progress,* v. 60, Dec. 1951, p. 108, 110, 114, 116. (Condensed from The Aging Characteristics of Binary Aluminum-Copper Alloys. H. K. Hardy.)

Previously abstracted from *Journal of the Institute of Metals.* See item 184-N, 1951. (N7, Al)

30-N. Grain-Boundary Diffusion in Metals. R. S. Barnes. *Metal Treatments and Drop Forging,* v. 18, Dec. 1951, p. 531-538.

Reviews past and present investigations on the mechanism of grain-boundary diffusion. An electrolytic method for determining the curve of constant concentration. A quantitative study is made from which a number of theories are deduced. Work on the Cu-Ni couple is illustrated. 21 ref. (N1, Cu, Ni)

31-N. The Recrystallization Texture of Drawn Aluminium Wire. J. Sawkill and N. Thorley. *Philosophical Magazine,* ser. 7, v. 42, Dec. 1951, p. 1369-1372.

Surveys previous literature. Results of an investigation show the existence of a minor (100) component. (N5, Al)

32-N. A Simplified Vacuum Furnace for Growing Metallic Monocrystals. John J. Gilman. *Review of Scientific Instruments,* v. 22, Nov. 1951, p. 854-855.

Advantages of this type of furnace design. Schematic diagram. (N12)

33-N. Kinetics of Isothermal Growth of Martensite Crystals. (In Russian.) B. Ia. Liubov. *Doklady Akademii Nauk SSSR,* new ser., v. 78, June 11, 1951, p. 895-898.

A series of equations is proposed describing the kinetics involved. These equations are interpreted for different values of the variables. (N8)

34-N. Nodule Genesis and Growth in Magnesium-Treated Hypoeutectic Irons. R. P. Dunphy and W. S. Pellini. *Foundry,* v. 80, Jan. 1952, p. 82-86, 195, 196, 198-200.

The nodule genesis and growth features of hypo-eutectic Mg-treated Fe were studied by examination of specimens quenched at various stages of solidification. It is deduced that nodules develop in close proximity to dendrites at the end-stage of austenite formation, immediately prior to the start of eutectic reaction. Nodule growth is believed to result from the malleablization of ledeburite. Gives cooling curves and microstructures. 11 ref. (N12, Fe, CI)

35-N. Martensitic Steels; Structural Transformations in Tempering. K. H. Jack. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 626-630.

Previously abstracted from the *Journal of the Iron and Steel Institute.* See item 260-N, 1951. (N8, J29, ST)

36-N. Iron-Carbon Alloys; Tempering of Martensite and Retained Austentite. J. Crangle and W. Sucksmith. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 630-634.

Previously abstracted from the *Journal of the Iron and Steel Institute.* See item 173-N, 1951. (N8, P16, CN)

37-N. Recrystallization of Tungsten. A. L. Simmons. *Metal Industry,* v. 79, Dec. 21, 1951, p. 519-520.

Results of experimental work on the annealing and recrystallization of tungsten and suitable maximum swaging temperatures. Graphs and tables. (N5, J23, F22, W)

38-N. Diffuse Scattering by an Ordering Alloy. (In English.) J. B. Newkirk, R. Smoluchowski, A. H. Geisler, and D. L. Martin. *Acta Crystallographica,* v. 4, Nov. 1951, p. 507-512.

At an early stage of the ordering reaction process in CoPt crystals, thin platelets of the ordered phase form on (110) planes of the disordered matrix phase. These platelets are coherent with the matrix. Since (110) planes of the two phases are not identical, when each is in an unstrained condition, they mutually strain each other, causing characteristic diffuse X-ray diffraction effects and the marked changes in physical properties previously reported. (N10, Co, Pt)

39-N. Secondary Recrystallization Texture in Copper. M. Sharp and C. G. Dunn. *Journal of Metal,* v. 4, Jan. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 42-43.

Orientations of 137 crystals of Cu were produced by secondary recrystallization in a cube texture matrix. Although the crystals were not prepared for the purpose of determining a secondary recrystallization texture, the orientations obtained confirm, in part, published results and disclose preferred orientations in the texture. (N5, Q24, Cu)

40-N. Solidification Mechanism of Steel Ingots. H. F. Bishop, F. A. Brandt, and W. S. Pellini. *Journal of Metals,* v. 4, Jan. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 44-54.

The solidification mechanism of low and high-carbon experimental steel ingots was studied by thermal analysis. It was determined that solidification proceeds in wave-like fashion at rates which are determined by the carbon level, superheat, and mold thickness. The thermal cycles of the mold walls are related to the course of solidification. Phase diagrams. 10 ref. (N12, D9, CN)

41-N. Annealing Textures in Rolled Face-Centered Cubic Metals. Paul A. Beck and Hsun Hu. *Journal of Metals,* v. 4, Jan. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 83-90.

Investigation of the orientation relationship between deformation texture and recrystallization texture in rolled face-centered cubic metals, using the quantitative methods of texture determination that have recently become available. Al, Cu, and brass were investigated. Quantitative pole figures for annealing textures. 40 ref. (Q24, N5, Al, Cu)

42-N. On the Solution of Diffusion Problems Involving Concentration-Dependent Diffusion Coefficients. Carl Wagner. *Journal of Metals,* v. 4, Jan. 1952; *Transactions of the American Mining and Metallurgical Engineers,* v. 194, 1952, p. 91-96.

Solutions of the differential equation of diffusion in binary alloys if the diffusion coefficient is an exponential function of the concentration of one of the components. (N1)

43-N. Nucleation in Phase Changes. R. S. Bradley. *Quarterly Reviews,* v. 5, no. 4, 1951, p. 315-343.

A comprehensive theoretical review. Numerous references. (N2)

44-N. Experimental Demonstration of Two Types of Solidification Occurring During Plastic Deformation of

Crystals. (In German.) Fritz Röhm and Werner Sautter. *Zeitschrift für Metallkunde,* v. 42, Oct. 1951, p. 289-293.
As applied to Al single crystals. Dependence of the recovery upon various factors. Charts, and diagrams. 10 ref. (N4, Q24, Al)

45-N. A New Point of View on the Theory of Metal Solidification. (In German.) Jakob Bingel. *Zeitschrift für Metallkunde,* v. 42, Oct. 1951, p. 309-315.
A new theory, according to which solidification curves are deduced analytically on the basis of the mechanical notch effect within the crystal. The theory is based upon the phenomenon of crystal division, causing an increase in the internal energy of the crystal. The hardening of metals is discussed on the same basis. 21 ref. (N12)

46-N. The Gamma Phase of Manganese. II. High-Temperature X-Ray Diagrams in the Gamma-Phase Region. (In German.) Ulrich Zwicker. *Zeitschrift für Metallkunde,* v. 42, Nov. 1951, p. 327-330.
Method for investigation of transformations. Data are tabulated and charted. (N6, M22, Mn)

47-N. The Lamellar Growth of Crystals. I. Experimental Part. (In German.) Ludwig Graf. *Zeitschrift für Metallkunde,* v. 42, Nov. 1951, p. 336-340.
Method for obtaining rapidly cooled samples showing intermediate, lamellar crystalline growth. Results show that both lamellar and dendritic structures are basic phenomena in crystal growth, differing according to crystal type. Micrographs show results obtained with Cu, Zn, W, Cd, Pb, Au, and NaCl. (N12, Cu, Zn, W, Cd, Pb, Au)

48-N. Investigation of Aluminum-Silicon Alloys; A Contribution to the Silumin Problem. (In German.) Roland Mitsche and Emma-Maria Onitsch-Modl. *Zeitschrift für Metallkunde,* v. 42, Nov. 1951, p. 341-344.
Reviews the refining of Silumin on the basis of the literature, adding results of new investigations. The definite similarity between the structural development of eutectic Al-Si and Fe-C alloys makes the assumption of a similar mechanism possible. Implications are discussed. 14 ref. (N12, Al)

49-N. An Experimental Investigation of the Diffusion of Electrolytic Hydrogen Through Metals. H. R. Heath. *British Journal of Applied Physics,* v. 3, Jan. 1952, p. 13-18.
An investigation was made on Fe, Ni, Co, Cu, Zn, Ag, Pd, Pt and Pb. Theory explaining general character of results given. 12 ref. (N1)

50-N. Examination and Rehabilitation of Graphitized Welded Joints. I. A. Rohrig and R. M. Van Duzer. *Combustion,* v. 23, Jan. 1952, p. 36-42.
Practice of Detroit Edison Co. in systematically checking high-temperature alloy-steel piping welds for signs of graphitization, also weld-deposition procedures employed to restore the welds. Micrographs, macrographs, and illustrations. 15 ref. (N8, K9, L24, AY)

51-N. Solidification of Metals. H. F. Bishop, and W. S. Pellini. *Foundry,* v. 80, Feb. 1952, p. 86-93, 253-261.
Summarizes recent information regarding the mode of solidification of important commercial metals. Basic factors which determine specific mode of solidification and practical applications to problem of producing sound castings. (N12)

52-N. A Method of Growing Single Crystals of Lead Telluride and Lead Selenide. W. D. Lawson. *Journal of Applied Physics,* v. 22, Dec. 1951, p. 1444-1447.
Crystals were grown for the purpose of testing the semiconducting and allied properties of PbTe and PbSe. (N12, P15, Pb, Te, Se)

53-N. The Transmission of Hydrogen Through Metals. H. B. Wahlin. *Journal of Applied Physics,* v. 22, Dec. 1951, p. 1503.
Experiments on Pd, Ni, Cb, Ta, and Mo. Substitution of electrolytic method for the heated Pd tube as a source of high-pressure, pure hydrogen in the laboratory. (N1)

54-N. Studies on the Kinetics of Transformation in Titanium Base Alloys. W. Rostoker. *Journal of Metals,* v. 4, Feb. 1952, p. 145.
A brief report. (N9, M24, Ti)

55-N. Diffusion in Iron Oxides. L. Himmel, R. F. Mehl, and C. E. Birchenall. *Journal of Metals,* v. 4, Feb. 1952, p. 147.
Measurements were made of the rates of self-diffusion of Fe in each of the three oxides of iron, using the decrease-in-surface-activity method with Fe as tracer. (N1, Fe)

56-N. Solid Solubility of Boron in Iron. M. E. Nicholson. *Journal of Metals,* v. 4, Feb. 1952, p. 148.
The solubility of B in α and γ Fe was redetermined. (N12, Fe, B)

57-N. The System Molybdenum-Boron. R. Steinitz. *Journal of Metals,* v. 4, Feb. 1952, p. 148.
The above was investigated in order to clarify its behavior at high temperatures. (N6, M24, Mo, B)

58-N. Distribution of Solute Elements Between Liquid and Solid Germanium. J. D. Struthers, H. C. Theuerer, E. Buehler, and J. A. Burton. *Journal of Metals,* v. 4, Feb. 1952, p. 149.

Concentrations range from 0.01 to 100 p.p.m. A known amount of Al, Ga, In, P, As, Sb, Ag or Au was added to a Ge melt from which either a single crystal or a polycrystalline ingot is prepared. The concentration of the element in the resulting solid Ge was determined as a function of the fraction solidified using radioactive-tracer techniques and electrical-conductivity measurements. (N12, Ge)

59-N. Generation of Porosity During Diffusion. R. W. Balluffi and B. H. Alexander. *Journal of Metals,* v. 4, Feb. 1952, p. 152.

A metallographic investigation of copper-α-brass, Ni-Cu, and Au-Ag couples revealed that significant porosity was caused directly by diffusion and was not a result of other possible causes. (N1, Cu)

60-N. Growth of Austenite in Cold-Rolled Tempered Martensite. A. E. Nehrenberg. *Journal of Metals,* v. 4, Feb. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 181.

In cold rolled tempered martensite, austenite grows in an equiaxial, rather than an acicular manner. Results of an experiment carried out to aid in understanding of this behavior. Micrographs. (N8, ST)

61-N. Kinetics and Orientation Relationships of Secondary Recrystallization in Silver. F. D. Rosi, B. H. Alexander, and C. A. Dube. *Journal of Metals,* v. 4, Feb. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 189-196.

The above phenomenon was investigated in the range 433-533° C. Results show that secondary grains have a preferred orientation which corresponds closely to that of the original deformation texture. Micrographs and graphs. 17 ref. (N5, Ag)

62-N. Work Required in the Formation of Martensite Nuclei. *Metal Progress,* v. 61, Jan. 1952, p. 122, 124, 126, 128, 146. (Translated and condensed from paper by G. V. Kurdyumov and O. P. Maksimova.)

Previously abstracted from *Doklady Akademii Nauk SSSR.* See item 201-N, 1950. (N8, ST)

63-N. The Position of the Ar^{III} Point in Chromium-Nickel Stainless Steel and Its Displacement by Cold Working. (In French.) Paul Bastien and Jacques Dedieu. *Métaux: Corrosion—Industries,* v. 26, Nov. 1951, p. 423-426.

Methods and results of investigation. The influence of Ni on the lowering of the Ar^{III} point in particular. Includes diagrams and charts. (N8, SS)

64-N. Causes of the Formation of Different Types of Primary Structures During the Crystallization of Steels. (In Russian.) A. P. Pronov. *Izvestiia Akademii Nauk SSSR,* Section of Technical Sciences, Apr. 1951, p. 576-578.

The effects of casting temperature and nonmetallic inclusion on the crystallization of steel ingots. Photomicrographs. (N12, ST)

65-N. Mechanism of Graphitization During Production of Nodular Cast Iron. (In Spanish.) Jose M. Navarro Alvargonzalez. *Instituto del Hierro y del Acero,* v. 4, Apr.-June 1951, p. 143-146.

A series of photomicrographs of sections of some nodules suggesting the probable mode of their formation. (N8, E25, CI)

66-N. Note on the Formation of Nodular Graphite in Castings Treated With Magnesium. (In Spanish.) Francisco Munoz del Corral. *Instituto del Hierro y del Acero,* v. 4, July-Sept. 1951, p. 227-229.

Briefly discusses theory. Includes diagrams. (N8, E25, CI)

67-N. Industrial Applications of the Isothermal Transformations of Austenite. (In Spanish.) Manuel Torrado. *Técnica Metalurgica,* v. 7, Mar. 1951, p. 58-66.

Isothermal, chronographic, and isochronal curves and their application in production of sintered bodies, airplane motors, high speed steels, etc. Charts, photomicrographs, and diagrams. 22 ref. (N8, ST)

68-N. Isothermal Transformation Of Austenite. (In Swedish.) **I. Introduction.** Axel Hultgren. **II. Transformation Diagram and Structures.** Axel Hultgren and others. **III. Distribution of Alloy Steels.** Kehsin Kuo and Axel Hultgren. **IV. Discussion of Results Obtained.** Axel Hultgren. **Appendix I. Preparation for Microscopic Investigation.** Axel Hutlgren and Kai Tikkanen. **Appendix II. Isolation and Chemical Analysis of Carbides in Steels.** Kehsin Kuo. *Jernkontorets Annaler,* v. 135, No. 8, 1951, p. 403-483; disc., p. 483-494.

Several ternary alloy steels of low alloy contents, and with usual amounts of Si, Mn, P and S, were examined. In most of them, cementite was the only carbide constituent present. Isothermal transformation rates and structures were studied and TTT-diagrams obtained. The carbide constituent was isolated electrolytically, X-rayed and analyzed: after tempering of martensite at constant temperatures for different periods at that temperature; and in bainite, as freshly formed near the nose temperature and after sub-

sequent holding at different temperatures. Many graphs, diagrams, and photomicrographs. 18 ref. (N8, ST)

69-N. The Diffusion of Copper in Cuprous Oxide. Walter J. Moore and Bernard Selikson. *Journal of Chemical Physics,* v. 19, Dec. 1951, p. 1539-1543.

Cu_2O strips were prepared by the oxidation of Cu at 1000° C. The diffusion of radiocopper in this material at 800 to 1050° gave a self-diffusion coefficient. It is suggested that parabolic rate constants with large negative entropies of activation and low heats of activation may be due to grain boundary diffusion. Data graphed, tabulated. (N1, Cu)

70-N. The Aging of Metals. J. Lomas. *Machinery Lloyd,* (Overseas Edition), v. 24, Jan. 9, 1952, p. 108-109, 111, 113.

Summarizes briefly the existing state of knowledge. The difference between the terms "quench-aging" and "strain-aging," and the methods of obtaining the optimum results with given materials. (N7, J27)

71-N. Effect of Alloying Elements on the Breakdown of Austenite at Sub-Zero Temperatures. Part I. J. O. Ward, M. D. Jepson and J. R. Rait. *Journal of the Iron and Steel Institute,* v. 170, Jan. 1952, p. 1-9.

In the preliminary experiments, using a 1% C, 0.3% Mn steel material, up to 3-4% of Mn, Cr, and Ni were added separately. The amount of subzero transformation was increased by Mn and Ni; but, although increasing at first upon addition of Cr, it fell off at more than 1% Cr. 16 ref. (N8, AY)

72-N. Diffusion in Indium Near the Melting Point. Roger E. Eckert and H. G. Drickamer. *Journal of Chemical Physics,* v. 20, Jan. 1952, p. 13-17.

Diffusion coefficients for the systems Tl^{204} in In and In^{114} in In were measured in the solid state and in the neighborhood of the melting point. The measurements were made in both polycrystalline masses and in single crystals. (N1, In)

73-N. Distribution of Hydrogen in Large Ingots and Forgings. J. D. Hobson and C. Sykes. *Journal of the Iron and Steel Institute,* v. 170, Feb. 1952, p. 118-122.

Severe segregation occurs and persists in finished forgings. The variation found depends upon the size of sample, being much more severe with small specimens. Rehydrogenation experiments demonstrate that segregation is not caused by variable hydrogen solubility. Some practical implications of the results. Data are tabulated. (N12, D9, ST)

74-N. Isothermal Martensite Formation in an Iron-Chromium-Nickel Alloy. S. A. Kulin and G. R. Speich. *Journal of Metals,* v. 4, Mar. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 258-263.

The isothermal formation of martensite at subzero temperatures was studied in an austenitic stainless steel. Amount of martensite formed isothermally in a given time was found to follow a C-curve behavior with decreasing temperature. It is believed that a general martensite theory must include the basic concepts of the strain embryo theory, and also the important role of thermal fluctuations. 12 ref. (N8, SS)

75-N. Origin of Recrystallization Textures. J. E. Burke. *Journal of Metals,* v. 4, Mar. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 263-264.

Discusses various theories. 10 ref. (N5)

76-N. Time-Temperature-Transformation Characteristics of Titanium-Molybdenum Alloys. D. J. DeLazaro, M. Hansen, R. E. Riley, and W. Rostoker. *Journal of Metals,* v. 4, Mar. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 265-269.

Summarizes, on conventional TTT-charts, the isothermal transformation products and pertinent reaction-rate data for binary alloys of Ti containing 1, 3, 5, 7, 9, and 11% Mo, respectively. The results were derived from metallographic examination. X-ray diffraction work was done to clarify certain points. (N9, M24, Mo)

77-N. Solubility of Carbon and Oxygen in Molybdenum. W. E. Few and G. K. Manning. *Journal of Metals,* v. 4, Mar. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 271-274.

It has been known for some time that both intergranular carbide and intergranular oxide phases cause brittleness in Mo. Hence experiments were made on their solubility at temperatures up to 4000° F., following heat treatments in various atmospheres. Results are tabulated, charted, and illustrated by photomicrographs. (N12, M24, Mo)

78-N. Relation Between the Volume of Martensite and the Number of Martensitic Plates Per Unit Volume. E. S. Machlin. *Journal of Metals,* v. 4, Mar. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 277-278.

Presents mathematical analysis of above problem conducted in an effort to solve the problem of the rate of nucleation during martensitic transformations. (N2, N8)

79-N. On the Mechanism of Precipitation in Copper-Beryllium Alloys. A. H. Geisler, J. H. Mallery, and F. E. Steigert. *Journal of Metals,* v. 4, Mar. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 307-316.

Reconciles existing data with some new data to present a more complete and rational analysis of the atomic re-arrangements involved in the process. Two different coherent precipitates were proposed. Each is responsible for a type of diffuse X-ray diffraction effect. 29 ref. (N7, Cu)

80-N. Dendritic Growth in Weld Metal. M. A. Scheil. *Metal Progress,* v. 62, Feb. 1952, p. 80-81.

Two macrographs, one of a weld made in five passes in Type 316 stainless steel plate; and the other of a 14-pass weld in 1½-in. stainless plate. In the first, demarkation between the layers is well defined. In the second, dendritic growth is practically continuous. (N12, K1, SS)

81-N. Isothermal Transformation of Nickel Steels. *Metal Progress,* v. 62, Feb. 1952, p. 102, 104-106, 108. (Condensed.)

Previously abstracted from *Metallurgia.* See items 148-N and 185-N, 1951. (N8, AY, SS)

82-N. The Recrystallization of Martensite. *Metal Progress,* v. 62, Feb. 1952, p. 158, 160. (Translated and condensed from "Recrystallization of Austenite Caused by Internal Stresses". K. A. Malyshev, V. D. Sadovskii, and B. G. Sazonov).

Previously abstracted from *Doklady Akademii Nauk SSSR.* See item 71-N, 1951. (N5, N8, ST)

83-N. Aging Phenomena in Iron and Steel After Rapid Cooling. J. D. Fast. *Philips Technical Review,* v. 13, Dec. 1951, p. 165-171.

Internal structure of iron and iron alloys; solubility of Mn, C, N_2, and O_2 in α-iron; nucleation; diffusion; precipitation; and quench aging as determined by hardness measurements. (N7, Fe, ST)

84-N. The Effect of Neutron Irradiation on Metallic Diffusion. T. H. Blewitt and R. R. Coltman. *Physical Review,* ser. 2, v. 85, Jan. 15, 1952, p. 384.

Diffusion in Cu_3Au samples. (N1, Au, Cu)

85-N. The Effect of Mercury on Selenium. H. K. Henisch and E. Q. Saker. *Proceedings of the Physical Society,* v. 65, sec. B, Feb. 1, 1952, p. 149-154.

The extent to which mercury can penetrate into Se specimens was investigated. Results show that there is penetration to considerable depths which may be due to diffusion through the lattice or along grain boundaries. The principal electrical effects are shown to be due to the formation of mercuric selenide at the surface. There is also evidence, from experiments with radioactive mercury, of rapid surface diffusion. (N1, P15, Hg, Se)

86-N. Thermodynamic Interpretation of Aging Phenomena in Alloys. (In Russian.) L. S. Palatnik. *Doklady Akademii Nauk SSSR,* new ser., v. 81, Nov. 1, 1951, p. 39-42.

The aging of alloys is explained from a thermodynamic standpoint. Results are discussed in relation to experimental data. Data are charted. (N7, P12)

87-N. The Nature of Molten Iron Silicate and Solutions of FeS in It. (In Russian.) Ia. I. Ol'shanskii. *Doklady Akademii Nauk SSSR,* new ser., v. 81, Nov. 1, 1951, p. 67-70.

The solubility of FeS in various mixtures of FeO, SiO_2, CaO, and MgO was studied experimentally. Data are charted. (N12, Fe)

88-N. Study of the Homogenization of Dendritic Segregates of Phosphorous and Arsenic in Alloy Steels. (In French.) André Kohn. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 233, Dec. 19, 1951, p. 1617-1619.

Diffusion of phosphorous in steels occurs more rapidly than that of arsenic. It does not appear to be influenced very much by the presence of alloying elements generally encountered. Micrographs. (N1, M27, AY)

89-N. Magnetic Study of Martensitic Transformations Produced by Working or by Heating of Steels Containing 18% Chromium and 4 to 12% Nickel. (In French.) Paul Bastien and Jacques Dedieu. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Jan. 14, 1952, p. 334-336.

(N8, SS)

90-N. X-Ray Measurement of Order in CuPt. C. B. Walker. *Journal of Applied Physics,* v. 23, Jan. 1952, p. 118-123.

In investigating the order-disorder transformations in CuPt, cell parameters were determined from specimens quenched at intervals from 25 to 890° C. The rhombohedral deformation of the ordered, layered structure was found to diminish with in-

creasing temperature, disappearing at a critical temperature of 815° C. Cold working an ordered sample was found to transform the alloy almost completely from the ordered rhombohedral cell to the disordered cubic cell. (N10, Pt, Cu)

91-N. Investigation of the Solidification of Steel. I. Theoretical Principles. (In Czech.) Nickolaj Chvorinov. *Hutnické Listy,* v. 6, Nov. 1951, p. 549-552; Dec. 1951, p. 594-598.

The solidification of steel is considered from a theoretical point of view. A series of factors are not included because of the lack of experimental data. A complicated method is suggested for further study of the problem. (N12. ST)

92-N. Recrystallization of Thin Layers of Copper; Experimental Results. (In French.) Antoine Colombani and Gaston Ranc. *Comptes Rendus hebdomadaires des Séances de l'Academie des Sciences,* v. 234, Jan. 2, 1952, p. 78-80.

Thin layers of Cu were deposited by thermal evaporation on plexiglas and NaCl supports. Thickness and structure of the deposits were studied. Diagrams and graphs. (N5, L25, Cu)

93-N. Growth Spirals on Gold Crystals Obtained by Precipitation. (In French.) Séverin Amelinckx, Carl C. Grosjean, and Willy Dekeyser. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Jan. 2, 1952, p. 113-115.

Studied with repsect to the theory of Frank which states that crystal growth occurs, in the case where supersaturation is small, by the joining of growth units along the exposed edge created by the formation of one or several helicoidal dislocations on one of the sides of the primary nucleus. Photograph and diagram. (N12, Au)

94-N. X-ray Study of the Aging of an Aluminum-Magnesium Alloy Containing 7% Magnesium. (In French.) Adrienne R. Weill. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Jan. 28, 1952, p. 523-525; disc., p. 525-526.

When tempering at 160 or 250° C. of above alloy is accompanied by the formation of Mg-rich precipitates, after 6 months at 55° C., one can detect by X-rays a strongly stressed state of the lattice, which was not noticeable at higher temperatures before the appearance of precipitates. Includes micrographs and discussion by Pierre Chevenard. (N7, Al)

95-N. Study of the Phenomena of Recrystallization by Electron Microscopy. (In French.) G. W. Rathenau. *Revue de Métallurgie,* Dec. 1951, p. 923-928; disc, p. 928.

Phenomena of recrystallization and grain growth in cold rolled, face-centered NiFe crystals were investigated. (N3, N5, Ni, Fe)

96-N. Spectrographic Study of the Diffusion of Copper and of Magnesium in Electrodeposited Al-Cu-Mg and Al-Zn-Mg-Cu Alloys. (In French.) Martial Renouard. *Revue de Métallurgie,* Dec. 1951, p. 944-955, disc., p. 955-956.

Theoretical, mathematical analysis. Experimental procedures, results, and their interpretation. The alloys studied are Al-base. Data are charted and tabulated. (N1, L17, Al)

97-N. A Method of Studying Changes of Phase at High Temperatures by Means of X-Rays. (In French.) H. T. Heal and H. Mykura. *Revue de Métallurgie,* Dec. 1951, p. 966-969.

A method in which a Geiger-Müller counter is used to measure the total intensity of a diffraction line emanating from any phase; and in which the counting cadence, registered electronically, indicates the proportion present of the phase in question. Application to transformations of a low-alloy steel. Graphs and diagram. (N6, AY)

98-N. Thermoelectric Study of the Recrystallization of Cu-Zn Alloys. (In French.) P. Laurant and M. Eudier. *Revue de Métallurgie,* Dec. 1951, p. 970-974.

Cold worked wires were placed in an oven at a constant temperature and taken out at various times; couples were formed with the annealed wires and their thermo-electric power at low temperature measured. Compositions studied varied from pure Cu (99.7%) to 70-30 Cu-Zn. Data are charted. 16 ref. (N5, Cu)

99-N. The Question of the Intermediate Transformation of Austenite. (In Russian.) R. I. Entin. *Doklady Academii Nauk SSSR,* new ser., v. 79, Aug. 21, 1951, p. 973-976.

Mechanism of the decomposition of austenite in the range 450-600° C. The influence of C, Ni, Cr, W, Mo, and Mn on variation of the mechanism. (N8, AY, ST)

100-N. The Influence of Carbon on the Self-Diffusion of Iron. (In Russian.) P. L. Gruzin, Iu. V. Kornev, and G. V. Kurdiumov. *Doklady Akademii Nauk SSSR,* new ser., v. 80, Sept. 1, 1951, p. 49-51.

Radioactive Fe^{59} was used to study the self-diffusion of Fe in various steels. Data are tabulated and charted. (N1, Fe, ST)

101-N. Capillary Phenomena During Contact Melting of Crystals. (In Rus-

sian.) D. D. Saratovkin and P. A. Savintsev. *Doklady Akademii Nauk SSSR*, new ser., v. 80, Oct. 1, 1951, p. 631-633.

The phenomenon of contact melting of Sn-Zn, Bi-Sn, Pi-Pb, and Pb-Sb metal pairs was studied experimentally. In each case a globule of one metal was melted by contact with a hot plate or sheet of the other. (N12, P12, Sn, Zn, Bi, Pb, Sb)

102-N. Certain Regularities of Diffusion and Mechancal Properties of Metals. (In Russian.) I. Ia. Dekhtiar. *Doklady Akademii Nauk SSSR*, new ser., v. 80, Oct. 21, 1951, p. 875-878.

The theory of rate processes is applied to self-diffusion and creep strength of Cu, Al, steel, Pb, and Sn. Data are tabulated and charted. (N1, Q3, Cu, Al, St, Pb, Sn)

103-N. "Diffusion" Supercooling During Crystallization of Binary Alloys. (In Russian.) G. P. Ivantsov. *Doklady Akademii Nauk SSSR*, new ser., v. 81, Nov. 11, 1951, p. 179-182.

By theoretical considerations it is shown that a layer of supercooled liquid is formed at the crystallization front even if equilibrium conditions are maintained. Results are charted. (N12)

104-N. The Question of the Influence of Deformation on the Kinetics of the Martensite Transformation. (In Russian.) O. P. Maksimova and A. I. Nikonorova. *Doklady Akademii Nauk SSSR*, new ser., v. 81, Nov. 11, 1951, p. 183-186.

The effect of temperature and amount of deformation on the martensite transformation was studied for various Ni and Mn steels. Data are charted. (N8, AY)

105-N. Kinetics of the Martensite Transformation at Temperatures Above Room Temperature. (In Russian.) G. V. Kurdiumov and O. P. Maksimova. *Doklady Akademii Nauk SSSR*, new ser., v. 81, Dec. 1, 1951, p. 565-568.

The martensite transformation in a steel containing 0.8% C and 2.2% Mn was studied at temperatures from −196 to +155° C. Data are charted. (N8, AY)

106-N. Modes of Decomposition of the Ferrous Oxide Phase. (In French.) Robert Collongues and Georges Chaudron. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Feb. 11, 1952, p. 728-729.

Experiments on iron or steel. Results and photomicrographs. (N8, Fe, ST)

107-N. Theory and Observations on Helicoidal Growth on the (0001) Faces of Silicon Carbide. (In French.) S. Amelinckx. *Journal de Chimie Physique et de Physico-Chimie Biologique*, v. 48, Nov.-Dec. 1951, p. 475-484.

A new theory of crystal growth based on the presence of dislocations in the crystal lattice. According to this theory, growth fronts develop in the spiral. Theory and results of a microscopic and interferometric study of (0001) faces of silicon carbide. The difference of level between two successive growth fronts was measured by means of an interferometric technique. Micrographs, diagrams, and tables. 18 ref. (N12, Si, C-n)

108-N. Role of Thermal, Mechanical, and Surface Treatments in the Cathodic Charging of Iron With Hydrogen. (In French.) Jean Duflot. *Revue de Métallurgie*, v. 49, Jan. 1952, p. 35-50.

Permeability of Armco iron for H_2 at room temperature, solubility of H_2 in Fe, the Fe-H_2 equilibrium, and the behavior of Fe when its H_2 content is as large as possible. Apparatus is diagrammed. Results are tabulated, charted, and illustrated by micrographs. (N1, P13, Fe)

109-N. Influence of Different Factors on the Kinetics of the Structural Hardening of Aluminum-Copper and Aluminum-Zinc Solid Solutions. (In French.) A. Berghezan. *Revue de Métallurgie*, v. 49, Feb. 1952, p. 99-113.

Investigated with respect to rate of annealing, method of recrystallization prior to tempering, mechanical and thermal treatments after tempering, and the relation between variation of mechanical properties and microstructure. Charts and micrographs. 25 ref. (N5, J general, Q general, M27, Al)

110-N. Study of the Martensitic Transformation in Austenitic Cast Iron. (In French.) P. Laurent and M. Batisse. *Revue de Métallurgie*, v. 49, Feb. 1952, p. 129-139.

The austenite-martensite transformation was studied for three normally austenitic castings. The formation of martensite facilitates subsequent graphitization, and an austenite micrographically distinct from the original austenite is produced. Tables, charts, and micrographs. (N8, CI)

111-N. Influence of Mechanical and Thermal Treatments Prior to Critical Cold Working on Recrystallization of Iron. (In French.) Michel Mouflard and Paul Lacombe. *Revue de Métallurgie*, v. 49, Feb. 1952, p. 140-144.

Results of experiments are tabulated, charted, and illustrated by macrographs. (N5, Fe)

112-N. The Lamellar Growth of Crystals. II. The Growth Mechanism of Crystals Which Are Not Close to Phase Equilibrium. (In German.) Ludwig Graf. *Zeitschrift für Metallkunde,* v. 42, Dec. 1951, p. 401-409.

A review on the basis of the literature and further experiments. The mechanism of crystal growth. 32 ref. (N12)

113-N. Effect of Cold Working on the Age Hardening of Soft Steel. (In German.) Wolfgang Gruhl. *Archiv für das Eisenhüttenwesen,* v. 23, Jan.-Feb. 1952, p. 39-45; disc., p. 45-46.

Experiments show that the specific electrical resistance of cold worked and age hardened steels decreases with degree of cold working and that increasing the age hardening temperature retards this resistance drop. This phenomenon is explained by reduced solubility of C and N_2 in the solid solution and by the re-formation of cementite and iron-nitride nuclei. Data are graphed. 29 ref. (N7, CN)

114-N. The Nucleation of the Solid. J. H. Hollomon and D. Turnbull. *American Institute of Mining and Metallurgical Engineers,* "The Solidification of Metals and Alloys", 1951, p. 1-19; disc., p. 19-23.

Mechanism of nucleation. By studying rate of solidification of dispersed samples of mercury over a very narrow temperature range, rate of nucleation as a function of time and temperature in the absence of impurities was measured. The observed nucleation rate is in good quantitative agreement with that predicted from the theory of nucleation now demonstrated to be correct quantitatively for the liquid-solid transition. 27 ref. (N2)

115-N. The Growth of Metal Crystals. Robert F. Mehl. *American Institute of Mining and Metallurgical Engineers,* "The Solidification of Metals and Alloys", 1951, p. 24-49; disc., p. 49-51.

Elementary facts and ideas concerning the growth of crystals, especially of metals. Growth of nuclei to large crystals. Includes diagrams and micrographs and a selective bibliography. (N12)

116-N. The Solidification of Steel Ingots. B. R. Queneau. *American Institute of Mining and Metallurgical Engineers,* "The Solidification of Metals and Alloys", 1951, p. 52-68; disc., p. 68-73.

Comprehensive discussion of various factors is used to coordinate and illustrate the principles discussed in the other papers in this book. Macrographs, tables, diagrams, and graphs. 11 ref. (N12, D9, ST)

117-N. Cathodic Sputtering for Micro-Diffusion Studies. Thomas F. Fisher and C. E. Weber. *Journal of Applied Physics,* v. 23, Feb. 1952, p. 181-183.

A method for uniform removal of microlayers of metal from cylindrical specimens based on sputtering of the metal from the cathode of a glow-discharge tube. Technique is applicable to diffusion studies, with advantages over more common methods. Tables. (N1)

118-N. The Relationship of Alpha and Beta Silicon Carbide. Henry N. Baumann, Jr. *Journal of the Electrochemical Society,* v. 99, Mar. 1952, p. 109-114.

Silicon carbide was formed under various time-temperature conditions from mixtures of SiO_2 and C and of Si and C. The products were examined by X-ray diffraction, electron and optical microscopy, and chemical analysis. Photomicrographs and tabular data. (N6, Si, C-n)

119-N. The Effect of the Elements of the First Long Period on the $\alpha \rightleftharpoons \beta$ Transformation in Titanium. A. D. McQuillan. *Journal of the Institute of Metals,* v. 80, Mar. 1952, p. 363-368.

The method in which the hydrogen pressure in equilibrium with an extremely dilute solution of H_2 in a Ti-rich alloy is measured as a function of temperature in order to follow the phase transformations occurring in the alloy, described in a previous paper (item 123-N, 1951) was used for a systematic investigation of the effects of V, Cr, Mn, Ni, and Co on the above transformation. The maximum amount of each addition element used was approximately 5 at.%. Graphs and micrographs. (N6, Ti)

120-N. Micrographic Aspects of the Diffusion of Zinc and Aluminium in Copper. H. Bückle and J. Blin. *Journal of the Institute of Metals,* v. 80, Mar. 1952, p. 385-389.

Various possible explanations of the phenomenon. The authors favor the one which assumes the existence of two different mechanisms of diffusion of the atoms of the alloying element, proceeding concurrently. 20 ref. (N1, Zn, Al, Cu)

121-N. Transformation Diagrams and the Hardenability of Alloy Steels. W. Steven. *West of Scotland Iron and Steel Institute Journal,* v. 58, 1950-51, p. 221-249.

Features of the formation of pearlite, bainite and martensite pertinent to studies of hardenability. Mechanical properties of the differ-

ent structures are compared; those of tempered martensite are independent of chemical composition only in a very restricted sense. The limited extent to which information relevant to continuous cooling can be derived from isothermal transformation diagrams, and the potential importance of experimentally determined continuous cooling diagrams. 25 ref.
(N8, J26, AY)

122-N. Allotropic Transformations of Strontium. (In French.) Emile Rinck. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Feb. 19, 1952, p. 845-847.

Existence of three allotropic modifications of Sr with transformation points at 235 and 540° C. was determined by thermal analysis, electrical resistivity, differential thermoelectric, and expansion measurements on a specimen of redistilled pure Sr. Includes graph.
(N6, Sr)

123-N. The Classical Picture of Recrystallisation After Work Hardening. D. I. Cameron. *Australasian Institute of Mining and Metallurgy, Proceedings,* new ser., Mar. 31-June 30, 1947, p. 15-30.

Necessity for careful examination of annealing conditions in the range 550-750° C. Examines the area between hot work and cold work and experimental methods suggested for determining the effects of residual work hardening from semihot work by a cold rolling-annealing process. The effect of prior partial anneals on inhibition of subsequent recrystallization. A series of micrographs shows the progress of recrystallization in a selected field. 12 ref.
(N5, J23, CN)

124-N. The Allotropic Transformation of Hafnium and a Tentative Equilibrium Diagram of the System Zirconium-Hafnium. J. D. Fast. *Journal of Applied Physics,* v. 23, Mar. 1952, p. 350-351.

Temperature of the transformation is at least 550° C. higher than the value recently reported by Duwez. A tentative equilibrium diagram of the system. (N6, M24, Hf, Zr)

125-N. Diffusion in Grain Boundaries. M. H. Dawson, M. R. Achter and R. Smoluchowski. *Journal of Applied Physics,* v. 23, Mar. 1952, p. 373-374.

Two Letters to the Editor. Dawson points out that the work of Achter and Smoluchowski on diffusion in grain boundaries may really be a study of grain boundary precipitation as a function of solute super saturation and orientation difference at grain boundaries. (N1)

126-N. Diffusion of Indium Into Gallium Near the Melting Point. R. E. Eckert and H. G. Drickamer. *Journal of Chemical Physics,* v. 20, Mar. 1952, p. 532.

Data are charted, tabulated, and discussed. (N1, In, Ga)

127-N. The Structure of Carbides in Alloy Steels. Part II. Carbide Formation in High-Speed Steels. H. J. Goldschmidt. *Journal of the Iron and Steel Institute,* v. 170, Mar. 1952, p. 189-204.

An X-ray investigation carried out on filings and electrolytic carbide extracts of high speed 18-4-1 type steels showed that, apart from the austenite-martensite transformation, a variety of changes in carbide structure can occur on hardening and tempering and with varying alloy content. 20 ref. (N8, TS)

128-N. Diffusion of Hydrogen in Iron and Iron Alloys at Elevated Temperatures. P. L. Chang, and W. D. G. Bennett. *Journal of the Iron and Steel Institute,* v. 170, Mar. 1952, p. 205-213.

Effects of Cr, Ni, and Mo on the rate of H_2 permeation in Fe. Cr has little effect on permeation in the γ range but greatly reduces the rate of permeation in the α range. Ni and Mo have little effect. The permeation equation was re-examined. Graphs and tabular data. 19 ref. (N1, Fe)

129-N. Joint Discussion on the Papers—Structural Transformations in the Tempering of High-Carbon Martensitic Steels, by K. H. Jack; Magnetic Analysis of Iron-Carbon Alloys: The Tempering of Martensite and Retained Austenite, by J. Crangle and W. Sucksmith. *Journal of the Iron and Steel Institute,* v. 170, Mar. 1952, p. 248-255.

Papers published respectively in June and Sept. 1951 issues; items 173-N, 1951 and 36-N, 1952.
(N8, P16, CN)

130-N. Isothermal Transformation Characteristics of an Iron-Chromium Alloy of Titanium. Charles W. Phillips and Donald N. Frey. *Journal of Metals,* v. 4, Apr. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 381-385.

A study of the behavior of commercial Ti-Fe-Cr alloy, Ti-150 during heat treatment. It exhibits a martensitic transformation on cooling, also two nucleation and growth reactions. The reactions were followed by metallographic, X-ray diffraction, and microhardness methods. Graphs and photomicrographs. (N11, N2, Ti)

131-N. S-Curves for Chromium Stainless Steels. *Metal Progress,* v. 61, Apr. 1952, p. 96-B.
(N8, SS)

132-N. The Question of the Migration of Austenitic Grain Boundaries. (In Russian.) M. G. Lozinskii. *Doklady Akademii Nauk SSSR,* new ser., v., 82, Jan. 1, 1952, p. 53-56.
Grain boundaries were observed to widen with increased temperature and with an increase of holding time at a given temperature. Apparatus is illustrated. (N3, ST)

133-N. The Kinetics of Superstructural Transformations. (In Russian.) N. S. Akulov and Ia. I. Feldshtein. *Doklady Akademii Nauk SSSR,* new ser., v. 82, Jan. 11, 1952, p. 221-223.
Ordering and magnetic properties of binary alloys. Face-centered and body-centered structures are considered. Results are compared with experimental data for CoMn.
(N10, P16, Co, Mn)

134-N. (Book) **The Solidification of Metals and Alloys.** 73 pages. 1951. American Institute of Mining and Metallurgical Engineers, 29 West 39th St., New York, 18, N. Y. $3.00.
Preface by Cyril Stanley Smith, plus three papers and accompanying discussion presented at an AIME symposium, Feb. 12, 1950. Individual papers are separately abstracted.
(N12)

135-N. Mechanism of the Influence of Preliminary Quenching on the Rate of Graphitization of Cast Iron. (In Russian.) K. P. Bunin and N. M. Danil'chenko. *Doklady Akademii Nauk SSSR,* new ser., v. 82, Jan. 21, 1952, p. 381-383.
The graphitization of white cast iron subjected to preliminary quenching and to isothermal treatment at 400° C. The large number of microscopic quenching cracks are considered as the sites for graphite nuclei, thus explaining the effect of preliminary quenching. (N8, CI)

136-N. A Study of the Nucleation and Growth Processes in the Synthesis of Colloidal Gold. John Turkevich, Peter Cooper Stevenson, and James Hillier. *Discussions of the Faraday Society,* No. 11, 1951, p. 55-75.
Includes graphs and electron micrographs. 31 ref. (N2, N3, Au)

137-N. Removal of Embrittling Gases From Zirconium. W. C. Lilliendahl. E. D. Gregory, and D. M. Wroughton. *Journal of the Electrochemical Society,* v. 99, May 1952, p. 187-190.
A process for removal of dissolved O_2 from Zr by heating the solid metal in molten or gaseous Ca. Equilibrium O_2-Zr ratios were determined as a function of time and temperature of treating. N_2 is not removed in the treating cycle, and contamination of the treated metal with this impurity may occur. This may be prevented by careful control of treating temperatures. At high treating temperatures, the process may be used for removal of N_2 from Ca. (N1, Zr)

138-N. The Solid Solubilities of Cadmium, Indium, and Tin in Aluminium. H. K. Hardy. *Journal of the Institute of Metals,* v. 80, Apr. 1952, p. 431-434.
The solid solubilities of Cd, In, and Sn in Al at 530° C. and above were estimated metallographically on electropolished specimens. 24 ref. (N12, Cd, In, Sn, Al)

139-N. Isothermal Mode of the Martensitic Transformation. E. S. Machlin and Morris Cohen. *Journal of Metals,* v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 489-500.
A study in a 71% Fe, 29% Ni alloy shows martensite formation takes place mainly by nucleation of new plates. Nucleation is activated by thermal fluctuations superimposed on localized regions of very high strain. The reaction-path concept offers a unified picture of the kinetics. Tables, graphs, and 17 ref. (N8, Fe)

140-N. Recrystallization of Aluminum Single Crystals After Plastic Extension. N. K. Chen and C. H. Mathewson. *Journal of Metals,* v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 501-509.
Relationship to structure of the deformed matrix. Shapes of new grains are analyzed with regard to slip planes and to presence or absence of deformation bands. A mechanism by which orientations of recrystallized grains are related to parent lattice. Tables, graphs, photographs, stereographic projections, and 14 ref. (N5, Q24, Al)

141-N. Grain Structure of Aluminum-Killed, Low Carbon Steel Sheets. *Journal of Metals,* v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 511-513.
Discussion of paper by R. L. Solter and C. W. Beattie; see item 243-N, 1951. (N3, M27, CN)

142-N. Theory of Grain Boundary Migration Rates. *Journal of Metals,* v. 4, May 1952, *Transactions of Amer-*

ican Institute of Mining and Metallurgical Engineers, v. 194, 1952, p. 513-514.

Discussion of paper by David Turnbull, item 194-N, 1951. (N1, P12)

143-N. Secondary Recrystallization in Copper Wire. *Journal of Metals,* v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 515.

Discussion of paper by Guido Bassi. See item 162-N, 1951. (N5, Cu)

144-N. Constitution and Precipitation-Hardening Properties of Copper-Rich Copper-Tin-Beryllium Alloys. *Journal of Metals,* v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 516-517.

Discussion of paper by R. A. Cresswell and J. W. Cutherbertson; item 247-N, 1951. (N7, M24, Cu)

145-N. Habit Phenomenon in the Martensitic Transformation. *Journal of Metals,* v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 519-520.

Discussion of paper by E. S. Machlin and Morris Cohen. See item 272-N, 1951. (N8, N12, Fe)

146-N. Isothermal Transformation and Properties of a Commercial Aluminum Bronze. *Journal of Metals,* v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 520-522.

Discussion of paper by A. S. Kasberg, Jr. and David J. Mack; item 262-N, 1951. (N9, Q general, Cu)

147-N. Effects of Tungsten or Molybdenum Upon the Alpha-Beta Transformation and Gamma Precipitation in Cobalt-Chromium Alloys. *Journal of Metals,* v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 524-526.

Discussion of paper by E. E. Fletcher and A. R. Elsea; item 261-N, 1951. (N6, N7, Co, Cr)

148-N. Abnormal Grain Growth in S-816 Alloy. A. I. Rush, J. W. Freeman, and A. E. White. *National Advisory Committee for Aeronautics,* Technical Note 2678, Apr. 1952, 30 pages.

Investigation to establish the fundamental causes of abnormal grain growth under conditions encountered during forging of blades for the gas turbine of jet engines. Abnormal grain growth was induced by temperature cycling alone. Water quenching of the bar stock from 2150 or 2300° F. rendered the samples susceptible to abnormal grain growth upon reheating to 2300° F. Air cooling was sufficient to induce grain growth during subsequent solution treatment for some of the prior treatments. Diagrams and micrographs. (N3, Co, SG-h)

149-N. Preparation of Grey Tin. *Nature,* v. 169, Apr. 12, 1952, p. 621-622.

Method for transformation of ordinary commercial types of tin to the gray allotropic modification. Pure Sn (99.99%) is deformed by cold work and allowed to recrystallize at a temperature below the $\alpha \rightleftharpoons \beta$ transformation temperature. For cooling, the tin may be packed in solid CO_2 during working. (N6, Sn)

150-N. Growth Spirals on Magnesium Crystals. A. J. Forty. *Philosophical Magazine,* ser. 7, v. 43, Apr. 1952, p. 481-483.

This is the first direct indication of the presence of screw dislocations in a simple metal crystal, though screw dislocations of large Burgers vector have been seen in chemically deposited gold. It is thought that the growth layers are either one or two atoms in thickness. (N12, Mg)

151-N. Growth Spirals of Silicon Carbide Crystals. (In French.) Adrienne R. Weill. *Comptes Rendus hebdomadaires des Séances de l'Academie des Sciences,* v. 234, Mar. 3, 1952, p. 1068-1070.

Theory of helical crystal growth beginning with dislocations which emerge at right angles to a crystallographic face, with respect to the different scales on which this phenomenon is observed on SiC crystals examined under the microscope by reflection without any preparation of the surfaces. (N12, Si, C-n)

152-N. Research on the State of Orientation of the Gold-Copper Alloy $AuCu_3$ With the Aid of Electron Interferences. (In German.) H. Raether. *Zeitschrift für angewandte Physik,* v. 4, Feb. 1952, p. 53-59.

Experimental study of the order-disorder transformation of thin vapor-deposited $AuCu_3$ films below, at, and above the critical temperature. Results are evaluated. Includes electron micrographs and diagrams. 15 ref. (N10, M21, Au, Cu)

153-N. Concentration of Crystal Nuclei During Their Separation From Supersaturated Solid Solutions. (In German.) Erich Scheil. *Zeitschrift für Metallkunde,* v. 43, Feb. 1952, p. 40-41.

Use of the Becker theory of separation of homogeneous solid solutions. Recommends further investigation of the growth process, in order to clarify W. Gerlach's observations on Au-rich, Au-Ni solid solutions. Graphs indicate dependence of precipitation upon concentration. (N12, Au)

154-N. A Crystal Growth Phenomenon in Antimony-Lead-Tin Alloys. (In German.) Karl Löhberg and Elisabeth Schulz. *Zeitschrift für Metallkunde,* v. 43, Feb. 1952, p. 50-53.

Dependence of crystal structure of Sb-Pb-Sn and Sb-Tl-Sn alloys on Sn content. Effects of small amounts of S, Se, or Te were also determined. (N12, Sb, Pb, Sn, Tl)

155-N. The Shape of the Solidification Curve of High-Purity Aluminum Crystals and the Formation of Deformation Curves. (In German.) Kurt Lücke and Hansheinz Lange. *Zeitschrift für Metallkunde,* v. 43, Feb. 1952, p. 55-66.

Shapes of the solidification curves of various metals were investigated during tensile stress. The process of solidification. Deformation bands, and the mechanism of their formation. Diagrams and micrographs, 44 ref. (N12, Q24, Al)

156-N. Structural Changes of Crystals by Bombardment With α-Particles. (In German.) Berthold Stech. *Zeitschrift für Naturforschung,* v. 7a, Feb. 1952, p. 175-185.

Debye-Scherrer diagrams indicate that bombarding certain types of crystals with large amounts of α-particles causes changes in their structures. Several examples. For instance, Se was converted from the amorphous to the most crystalline modification by this means. 28 ref. (N6, Se)

157-N. TTT-Diagrams for 7 and 9% Chromium Steels. Wm. L. Frankhouser and G. N. Emmanuel. *Metal Progress,* v. 61, May 1952, p. 74-79.

Experimental procedure and TTT-diagrams. Curves were constructed to represent the transformations involved. Micrographs. (N8, SS)

158-N. Isothermal Transformation of 9% Cr Steel. Wm. L. Frankhouser. *Metal Progress,* v. 61, May 1952, p. 96-B.

Data sheet giving TTT-diagram and photomicrographs. (N8, SS)

159-N. Recrystallization and Fabrication of Tungsten. *Metal Progress,* v. 61, May 1952, p. 172, 178. (Condensed from "Recrystallization of Tungsten". A. L. Simmons.)

Previously abstracted from *Metal Industry.* See item 37-N, 1952. (N5, J23, F22, W)

160-N. Study Formation of Zinc Crystals. *Metal Progress,* v. 61, May 1952, p. 180. (Condensed from "The Study of Recrystallization in Zinc by Direct Observation". G. Brinson and A. H. W. Moore.)

Previously abstracted from original *Journal of the Institute of Metals.* See item 205-N, 1951. (N5, M21, Zn)

161-N. Diffusion of Elements in Molten Iron. (In Russian.) B. V. Stark, E. V. Cheleshchev, and E. A. Kozachkov. *Izvestiia Akademii Nauk SSSR,* Section of Technical Sciences, Nov. 1951, p. 1689-1695.

An experimental study. Apparatus and method. Data are charted for diffusion of Mn and Si in Fe. (N1, Fe)

162-N. Discussion on Problems of the Theory of Phase Transformations in Steels and Alloys Concerning the Basic Ideas of the Theory of Phase Transformations in Solids. (In Russian.) V. I. Arkharov. *Izvestiia Akademii Nauk SSSR,* Section of Technical Sciences, Nov. 1951, p. 1744-1751. (N general)

163-N. (Book) **Diffusion in Solids, Liquids, Gases.** W. Jost. 558 pages. 1952. Academic Press Inc., 125 E. 23rd St., New York 10, N. Y.

Chief aim is to assist in planning, evaluating, and understanding diffusion experiments, at the same time giving a survey of the results obtained to date. Disorder in crystals; electrolytic conduction and diffusion in ionic crystals; diffusion in metals and non-polar crystals; diffusion and solubility in solids; mobility of ions in solid and molten metals and alloys; surface reactions of metals, formation of protective layers and related reactions; diffusion in gases and liquids; and thermal diffusion. (N1)

164-N. (Book) **Isothermal Transformation Diagrams for Nickel Steel.** 57 pages. 1951. The Mond Nickel Co., Ltd., Curzon St., London, W. 1, England.

The construction, general features, and limitations of isothermal transformation diagrams. The effect of various elements on the transformation, the influence of structure on mechanical properties, and special heat treatments based on these diagrams. Facing each of the 13 diagrams is a page of tabular data concerning the particular Ni steel represented. (N8, Q general, J26, AY)

165-N. Kinetics of Crystalline Nucleus Formation in Supercooled Liquid Tin. Guy M. Pound and Victor K. La Mer. *Journal of American Chemical Society,* v. 74, May 5, 1952, p. 2323-2332.

Oxide-coated droplets of molten Sn of a narrow size range were supercooled to 120° C. below their melting point. The specimens each consisted of several grams or about 10^{10} of the droplets. Rate of nucleation of crystals in the droplets was measured dilatometrically as a function of temperature and droplet size. The nucleation process appears to be inhomogeneous. Nucleating impurities are shown to be present in amounts proportional to droplet area rather than volume. Two different theoretical equations for heterogeneous nucleation rate fit the data. Minimum solid-liquid interfacial free energy and kinetic coefficient for heterogeneous nucleation were calculated from the data. Tables and graphs. 15 ref. (N2, N12, Sn)

166-N. p-n Junction Method for Measuring Diffusion in Germanium. W. C. Dunlap, Jr., and D. E. Brown. *Physical Review,* ser. 2, v. 86, May 1, 1952, p. 417-418.

Diffusion of an n-type impurity into a p-type semiconductor creates a p-n junction which can be detected electrically by the thermoelectric effect of a hot needle or by a rectification probe. Study of the rate of penetration of the p-n junction into the semiconductor can be used to measure the diffusion coefficients of various impurities in such semiconductors as Ge or Si. Object of the work described was to establish validity of the method by direct measurement of diffusion, by the p-n junction method, and by the radioactive-tracer method. Sb was the impurity studied. Graphs. (N1, Ge)

167-N. Low Temperature Properties of Tin, Soft Solders and Soft Soldered Joints. H. C. Watkins. *Research,* v. 5, May 1952, p. 231-234.

White tin undergoes transformation to the gray allotrope at low temperatures. It was thought that this might cause failure in soldered joints. Shows that the change may be inhibited or retarded by the addition of traces of certain metals. Gives optimum compositions for solders which are to be subjected to low-temperature conditions. (N6, K7, Sn)

168-N. Isotopic Exchange Between Metallic Silver and Its Ions in Solution. (In French.) Maria do Carmo Anta and Maurice Cottin. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Apr. 21, 1952, p. 1686-1688.

The Ag-$AgNO_3$ system was investigated, using the powdered silver isotope Ag^{110}. Conclusions exclude the possibility that rate of exchange is determined by self-diffusion in the metallic phase. (N1, Ag)

169-N. The Phenomenon of Structural Precipitation. (In French.) *Journal d'Informations Techniques des Industries de la Fonderie,* Feb. 1952, p. 17-21.

Micrographic structure resulting from precipitation. Various consequences. Applies to Al-Cu alloys in particular. Tables and micrographs. (N7, Al, Cu)

170-N. Are Our Hot-Stream Structural Parts Being Endangered by Graphitization? (In German.) Cl. Holzhauer. *Brennstoff-Wärme-Kraft,* v. 4, Apr. 1952, p. 134-135.

The graphitization problem, and the tendency of different types of alloy steels toward graphite formation. (N8, AY, ST)

171-N. Hydrogen Diffusion; Process in Iron and Iron Alloys at Elevated Temperatures. P. L. Chang and W. D. G. Bennett. *Iron & Steel,* v. 25, May 17, 1952, p. 240-243 disc., p. 261-264.

Previously abstracted under similar title from *Journal of the Iron and Steel Institute.* See item 128-N, 1952. (N1, Fe, ST)

172-N. Ingots and Forgings; Distribution of Hydrogen. J. D. Hobson and C. Sykes. *Iron & Steel,* v. 25, May 17, 1952, p. 243-245; disc., p. 261-264.

Previously abstracted under similar title from *Journal of the Iron and Steel Institute.* See item 73-N, 1952, p. 118-122. (N12, D9, ST)

173-N. The Ageing Characteristics of Ternary Aluminium-Copper Alloys With Cadmium, Indium, or Tin. H. K. Hardy. *Journal of the Institute of Metals,* v. 80, May 1952, p. 483-492.

Hardness vs. aging-time curves were obtained between 30 and 240° C. for Al-Cu alloys containing 2, 3, or 4% Cu with 0.01 or 0.05% In or Sn. Includes thermodynamic analysis of short-range ordering in ternary solid solutions. Graph and tables. 39 ref. (N7, M26, Q29, Al)

174-N. Stress-Recovery in Aluminium. W. A. Wood and J. W. Suiter. *Journal of the Institute of Metals,* v. 80, May 1952, p. 501-506.

Changes in strength and structure were observed during the deformation of Al in which the grains had already been broken down to a fine

substructure by previous straining. "Stress-recovery" refers to the new structural growth effects produced by simultaneous heating and straining which are of an order of magnitude greater than that obtainable by heating alone. Graphs, diagrams, photomicrographs, and X-ray photographs. 17 ref. (N4, Q24, Al)

175-N. Allotropic Transformation in Titanium-Zirconium Alloys. Pol Duwez. *Journal of the Institute of Metals,* v. 80, May 1952, p. 525-527.

In Ti-Zr alloys, transformation from the high-temperature body-centered cubic β solid solution to the low-temperature hexagonal close-packed α solid solution is shown to take place, at least partially, at all compositions and at rates of cooling as high as 8000° C. per sec. Transformation is not complete; the amount of β solid solution retained is a maximum in alloys containing 50 at. % of each metal. Graphs. (N6, Ti, Zr)

176-N. Volume Change at the Ar_3 Transformation. A. H. Smith and F. C. Thompson. *Journal of the Iron and Steel Institute,* v. 171, May 1952, p. 38-40.

In view of the great discrepancies between results obtained by earlier workers, the volume change associated with the $\gamma \rightarrow \alpha$ transformation was redetermined for a specially pure Armco iron, and found to be 1.16%. This figure is in good agreement with that derived from X-ray data. Since this value should be about 9% if the iron ion is the same size in both the γ and α forms, a significant change in ion size must occur, as is expected from the alteration in coordination number. It was found that this change amounts to a contraction of 2.4% of the ionic radius at the Ar_3 inversion, which agrees well with Goldschmidt's figures. (N6, P10, Fe)

177-N. Microscopical Studies on the Iron-Nickel-Aluminium System. Part III. Transformations of the β and β' Phases. A. J. Bradley. *Journal of the Iron and Steel Institute,* v. 171, May 1952, p. 41-47.

Photomicrographs illustrate the reactions that take place when the body-centered cubic structures of the Fe-Ni-Al system break up during cooling. The decomposition may take place either by deposition of the face-centered cubic lattice, or by its splitting into two phases, one ordered, the other disordered. The former process is predominant at higher temperatures, and the latter at lower temperatures. High coercivity is exclusively connected with incipient breakdown of the nonmagnetic NiAl-rich ordered structure, which must remain predominant in order to form a continuous matrix. Under the most favorable circumstances, this precipitate consists entirely of the lamellar ferromagnetic Fe-rich β-phase. Discusses Fe_2NiAl-type of permanent-magnet alloy. 25 ref. (N6, P16, Fe, Ni, Al, SG-n)

178-N. Occurrence of Sigma Phase in a High Chromium-Nickel Steel and the Effect of Carbon Content. R. E. Lismer and K. W. Andrews. *Journal of the Iron and Steel Institute,* v. 171, May 1952, p. 49-58.

Effect of 0.06-0.29% C on sigma-phase formation in a commercial 25-15 Cr-Ni steel. Mode of formation of sigma phase from duplex austenite-ferrite, austenite-carbide, or austenite structures was investigated by consideration of changes produced by heating at 700 and 900° C. for periods of up to 2000 hr. after solution treatment over temperatures from 950 to 1250° C. Results of microscopical and X-ray examination. Etching characteristics of the various phases and constituents that may be present. 13 ref. (N8, M27, SS)

179-N. Heterogeneous Nucleation of Graphite in Hypo-Eutectoid Steels. W. E. Dennis. *Journal of the Iron and Steel Institute,* v. 171, May 1952, p. 59-63.

Effects of different atmospheres during graphitization, and of prior heat treatment in the austenitic range, upon reaction rate. It was found that the rapid graphitization of these steels is caused by heterogeneous nucleation of graphite by alumina dispersions formed by internal oxidation during graphitization. Rate of nucleation seems to be dependent on the extent to which the residual Al is segregated prior to graphitization. 22 ref. (N2, N8, CN)

180-N. Recrystallization of Tantalum. G. W. Wench, K. B. Bruckart, and R. H. Deibler. *Journal of Metals,* v. 4, June 1952, p. 596.

Primary recrystallization kinetics of high-purity Ta (99%), which had been reduced 40% in thickness by cold rolling, were studied and kinetic relations determined. (N5, Ta)

181-N. Diffusion and Precipitation of Carbon in Some Alloys of Iron. Charles Wert. *Journal of Metals,* v. 4, June. 1952: *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 602-603.

Studied in Fe and in alloys containing small amounts of Ni, Mo, Cr, Mn, and V, by observing shape and position of the internal-friction peak at 0.9 cycle per sec. (N1, N7, Fe)

182-N. Transformation in Cobalt-Nickel Alloys. J. B. Hess and C. S. Barrett. *Journal of Metals,* v 4, June, 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 645-647.

A curve was determined showing the temperatures at which deformation begins to transform the cubic phase to the hexagonal phase in Co-rich Co-Ni alloys. A similar curve was determined for the strain-induced reverse transformation in the same alloys. The two curves agreed within experimental error and thus determine a curve of equal stability, which is also judged to be the curve giving equal free energy for the phases when they have the same composition. (N6, Q24, Co, Ni)

183-N. Effect of Applied Stress on the Martensitic Transformation. S. A. Kulin, Morris Cohen, and B. L. Averbach. *Journal of Metals,* v. 4, June, 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 661-668.

The martensitic transformation can be initiated by elastic stresses at temperatures above M_s in a steel containing 20% Ni and 0.5% C. Shear strains and normal tensile strains acting on a potential habit plane promote the transformation, but compressive strains oppose it. Graphs and micrographs. 23 ref. (N8, SS)

184-N. Some Factors in the Growth of Crystals. Dan McLachlan, Jr., Allan Carlson, Carl J. Christensen, and Alan King. *Utah Engineering Experiment Station,* Bulletin 57, Jan. 1952, 62 pages. (*Bulletin of the University of Utah,* v. 42, no. 9).

A theoretical, mathematical presentation. Extensions of the Donnay-Harker Law; crystal growth from solution; dendritic growth; and evolutionary aspects of crystal growth. 21 ref. (N12)

185-N. Growth and Crystallography of Deformation of β-Phase Uranium Single Crystals. (In English.) A. N. Holden. *Acta Crystallographica,* v. 5, Mar. 1952, p. 182-184.

Single crystals of the tetragonal β-phase of U were grown in material containing small amounts of Cr by a $\gamma \rightarrow \beta$ phase-transformation method. These crystals could be retained in a metastable condition for long periods following their quenching from normal β-phase temperatures into water at room temperature. (N12, M26, U)

186-N. New Type of Graphitization of Cast Iron Cooled Through Eutectoid Range. (In English.) Keizo Iwase. *Japan Science Review,* v. 2, Aug. 1951, p. 189-196.

Purpose of study was to clarify the mechanism of formation of free ferrite in the "bull's eye" structure sometimes observed in blackheart malleable cast irons and in nodular cast irons, as well as in some pearlitic gray cast irons. Believes that such formation of free ferrite is caused by "lateral" Ar_3 transformation and that precipitation of graphite from free ferrite is a necessary condition. Graphs and micrographs. (N8, CI)

187-N. Influence of Adsorption of Gases on the Surface Transformation of a Martensitic Structure by Tempering a Hardened Steel. (In French.) Joseph Maurer. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Apr. 28, 1952, p. 1773-1775.

Variation in rate of the martensite-pearlite transformation with type of atmosphere present was studied. The effect is due to adsorption of gas at the surface of the crystalline lattice. Gases studied were H_2, Ne, A, and CO_2. The steel contained 0.8% C. Graphs. (N8, ST)

188-N. Effect of Extremely High Cooling Rates on the Solidification and Structure of Binary Alloys. (In German.) Günter Falkenhagen and Wilhelm Hofmann. *Zeitschrift für Metallkunde,* v. 43, Mar. 1952, p. 69-81.

Preparation of supersaturated solid solutions of binary alloys by sudden quenching at extremely high temperatures. The X-ray back-reflection process was used to determine the amount of solute in solution. Alloys studied were Al-Ti, Al-V, Al-Cr, Al-Mn, Al-Fe, Pb-Na, Pb-Te, Pb-Ca, and Cu-Cr. Diagrams, tables, graphs, micrographs, and X-ray diagrams. 53 ref. (N12, Al, Pb, Cu)

189-N. Remarks on the Appearance of Sweating Out in Ingots. (In German.) Voya Kondic, William Shakespeare, and Geoffrey James Shaw. *Zeitschrift für Metallkunde,* v. 43, Mar. 1952, p. 95-97.

Experiments on various ferrous and nonferrous metals and alloys made to test the assumption that sweating out is caused by different forces, such as hydrostatic forces, gas pressure, shrinkage pressure, and capillary forces. Authors believe that this effect is primarily caused by shrinkage stresses under certain

solidification conditions. Diagram, tables, and photomicrographs. (N12, D9, C5)

190-N. Research on Grain Growth in the Primary Recrystallization of Slightly Deformed Aluminum Foil. (In German.) Klaus Eickhoff and Kurt Lücke. *Zeitschrift für Metallkunde,* v. 43, Apr. 1952, p. 118-124.

Annealed, rolled, pure-Al foil further reduced 4-7%, and recrystallized at 350-400° C., revealed very slight formation of nuclei, which made it easy to measure rate of grain growth. Results are compared with those of other authors and conclusions on mechanism of grain growth are discussed. Several special phenomena accompanying grain growth. Tables, graphs, and photographs. 13 ref. (N3, A1)

191-N. The Problem of the Influence of Quenching Temperature of Steel on the Amount of Residual Austenite. (In Russian.) V. D. Sadovskii and G. N. Bogacheva. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Mar. 11, 1952, p. 221-222.

Data from experiments with a steel containing 1.2% C, 0.20% Mn, and 6.0% Ni are claimed to prove that the conclusions of Harris and Cohen on the effect of quenching temperature on residual austenite are in error and that graphitization is the cause of the observed phenomena. Data are tabulated. (N8, J26, AY)

192-N. Boundary Migration During Grain Growth. R. L. Fullman. *American Society for Metals,* "Metal Interfaces", 1952, p. 179-207.

An extension of the quantitative analysis of grain-growth kinetics, using more detailed models than have been applied previously. An elementary theory previously developed leads to the prediction that grain diameter should be approximately proportional to the square root of the annealing time during isothermal annealing. Elementary theory adequately describes the growth of froth cells, but in metals, grain diameter is frequently proportional to the annealing time raised to a power which generally differs from ½. Examines extent to which various factors may alter the grain-growth exponent predicted by theory. 55 ref. (N3)

193-N. Interface Migration in Recrystallization. Paul A. Beck. *American Society for Metals,* "Metal Interfaces", 1952, p. 208-247.

The most important variables affecting rate of interface migration in recrystallization, and certain features of the more recently discovered types of interface migration, closely connected with recrystallization phenomena. Micrographs, also tables and graphs. 67 ref. (N5)

194-N. Phase Transformation at Interfaces. Alfred H. Geisler. *American Society for Metals,* "Metal Interfaces", 1952, p. 269-295; disc., p. 295-298.

Theoretical analysis and experimental observations indicate that a nodular process that is nucleated almost exclusively at grain boundaries is found with all three main types of transformations in solid solutions. The process consists of formation of a recrystallized ordered phase in the order-disorder reaction, of a recrystallized matrix plus incoherent precipitate in the precipitation reaction, and of two new incoherent phases in the eutectoid reaction. 41 ref. (N general, P10)

195-N. (Book) **Diffuziia v Metallakh i Splavakh.** (Diffusion in Metals and Alloys.) V. Z. Bugakov. 212 pages. 1949. Government Publishing House for Technical-Theoretical Literature, Moscow and Leningrad, U.S.S.R.

Results of investigations by the author and co-workers. Divided into two principal sections: Atomic diffusion and reactive diffusion. The latter includes a subsection on the reaction of iron with molten zinc (theory of zincification of iron.) Graphs and tables. 101 ref. (N1, L16, Zn, Fe)

196-N. Preparation of Bicrystalline Lead Plates. F. W. Brugman and T. J. Tiedema. *Applied Scientific Research,* v. 3, sec. A, No. 3, 1952, p. 250-252.

Technique of preparation which can be considered as a variation on the methods of Dunn and Tiedema for preparing crystals with a predetermined orientation by recrystallization of test pieces of solid metal. (N5, Pb)

197-N. Theory of Nucleation in Solids. Roman Smoluchowski. *Industrial and Engineering Chemistry,* v. 44, June 1952, p. 1321-1323.

The basic problem, and complications caused by a departure from conditions for applicability of Volmer's theory. Various theories and their comparisons with experimental data. In particular, the nucleation theory of recrystallization and its successful interpretation of observations. 20 ref. (N2)

198-N. Precipitation From Solid Solution. J. C. Fisher, J. H. Hollomon, and J. G. Leschen. *Industrial and Engineering Chemistry,* v. 44, June 1952, p. 1324-1327.

Shows that elastic strains can be present in particles that precipitate from solid solution, and in the surrounding parent phase as well. When nucleation theory is modified to include the effects of elastic distortion, most of the characteristics of precipitation from solid solution can be accounted for. 12 ref. (N7)

199-N. Strain Hardening and Aging. H. A. Unckel. *Iron & Steel,* v. 25, June 1952, p. 273-278.

A study on the quench-aging and strain-aging behavior of low-carbon steels with different carbon contents and different treatments. Includes graphical and tabular data on hardness and tensile properties. Photomicrographs. 12 ref. (N7, J27, CN)

200-N. Transitions in the Chromium-Manganese and Nickel-Vanadium Sigma Phases. W. B. Pearson. *Nature,* v. 169, May 31, 1952, p. 934.

Brief note on these transitions and on structures present above the transition temperature. (N6, Cr, Mn, Ni, V)

201-N. (French.) **X-Ray Study of the Transformations of 7%+Mg-Al Alloys During Tempering.** A. R. Weill. *Revue de Métallurgie,* v. 49, May 1952, p. 364-373.

Previously abstracted from *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences.* See item 94-N, 1952. (N7, Al)

202-N. (French.) **Contribution to the Study of the Aging of Iron-Carbon Alloys by Measuring Their Electric Conductivities.** H. J. Seemann and W. Dickenscheid. *Revue de Métallurgie,* v. 49, May 1952, p. 379-384.

Experiments on α-Fe alloys with carbon, using procedure recently described by Gruhl. Alloys containing 0.04 and 0.16% C were studied most thoroughly. Those containing 0.62 and 0.92% C were also investigated. Graphs and micrograph. (N7, P15, Fe, ST)

203-N. (German.) **Measurement of Diffusion Layers in Iron by Means of Microhardness Testing.** Ulrich Zwicker. *Metalloberfläche,* ser. A, v. 6, June 1952, p. A81-A87.

How the depth of penetration of diffusion layers in iron can be measured by microhardness testing. Method for interpreting the curves; various types of diffusion are compared. Some examples of the effect of alloys and of electrolytic intermediate layers. Graphs. (N1, Q29, Fe)

204-N. (Russian.) **The Stabilization of Austenite in Relation to the Martensite Transformation.** G. N. Bogacheva and V. D. Sadovskii. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Apr. 1, 1952, p. 569-572.

Experiments were made by changing the rate of cooling the steel or by reheating slightly before the M^s point is reached. Data are charted for several high and low-alloy steels, including a 30.5% Ni iron alloy. (N8, AY, SS, Fe)

205-N. (Russian.) **Growth of Spherical and Needle-Shaped Crystals of Binary Alloys.** G. P. Ivantsov. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Apr. 1, 1952, p. 573-576.

A mathematical analysis. (N12)

206-N. (Russian.) **Investigation of the Decomposition of the Solid Solution of Mg in Al.** M. I. Zakharova and L. M. Baldina. "Uchenye Zapiski. Vypusk 134. Fizika. Kniga Piataia" (Scientific Records. Vol. 134. Physics. Vol. 5), Lomonsov's Moscow State University, 1949, p. 100-106.

An X-ray study was made of the dependence of lattice constants of the 10% Mg-Al alloy on annealing time after various treatments. Data are tabulated. (N7, M26, Al)

207-N. (Russian.) **Investigation of the Phenomenon of Recovery of Duralumin During Aging.** M. I. Zakharova and N. V. Lukovskaia. "Uchenye Zapiski. Vypusk 134. Fizika. Kniga Piataia" (Scientific Records. Vol. 134. Physics. Vol. 5), Lomonsov's Moscow State University, 1949, p. 107-112.

A study was made of hardness recovery in duralumin after various heat treatments. Data are tabulated. (N7, Al)

208-N. On the Kinetics of Order in Ni_3Mn. Lewis R. Aronin. *Journal of Applied Physics,* v. 23, June 1952, p. 642-643.

A study of kinetic behavior in specimens initially cooled through the ordering range as a function of subsequent prolonged isothermal heat treatments. Room-temperature measurement of electrical resistivity and saturation induction gives evidence substantiating existence of ordered domains. Anomalies, and dependence of equilibrium, resistivity, and magnetic phenomena on domain growth. Graphs. (N10, P15, P16, Ni)

209-N. Thermoelastic Analysis of Transformations in Copper Alloys. R. Cabarat, P. Gence, L. Guillet, and R. Le Roux. *Journal of the Institute of Metals,* v. 80, Dec. 1951, p. 151-156.

Effect of allotropic transformations on elastic modulus and logarithmic decrement of Cu alloys was investigated. To determine these properties, a specimen was subjected to longitudinal vibrations of small amplitude and high frequency under reduced pressure. Formation of body-centered cubic phases on heat-

ing eutectoid Cu-Al and Cu-Sn alloys results in a marked decrease in elastic modulus, while the logarithmic decrement assumes large values before and during the transformation. 14 ref. (N6, Q21, Cu)

210-N. Principles of Zone-Melting. W. G. Pfann. *Journal of Metals,* v. 4, July 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 747-753.

Consequences of the zone-melting manner of "freezing" are examined with respect to solute distribution in the ingot, with particular reference to purification and to prevention of segregation. Results are expressed in terms of the number, size, and direction of travel of the zones, the initial solute distribution, and the distribution coefficient confined to theory and procedures. Numerous graphs and diagrams. (N12)

211-N. Recrystallization Textures in Copper Wire. G. Bassi. *Journal of Metals,* v. 4, July 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 753-754.

Three electrolytic tough-pitch Cu wires of different initial textures were drawn and annealed varying amounts and at varying temperatures. Deformation and recrystallization textures were examined by X-ray diffraction. (N5, Q24, Cu)

212-N. Effect of Molybdenum and of Nickel on the Rate of Nucleation and the Rate of Growth of Pearlite. R. Wayne Parcel and Robert F. Mehl. *Journal of Metals,* v. 4, July 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 771-780.

A systematic study of nucleation and growth for eutectoid alloy steels containing Mo and Ni. New data on the effect of Mo on the interlamellar spacing of pearlite. Tables, graphs, and photomicrographs. 23 ref. (N8, AY)

213-N. The Self-Perpetuating Step in Crystal Growth From the Melt. Bruce Chalmers and Ursula M. Martius. *Philosophical Magazine,* ser. 7, v. 43, June 1952, p. 686-687.

The general theory of crystal growth and the problem of nucleation of new layers on a growing crystal surface. (N12)

214-N. (French.) **The Possibility of Utilizing Oxidation Coloring at Low Temperatures for Studying the Recrystallization of Iron.** Jean Bardolle. *Comptes Rendus hebdomadaires des Séances de l'Academie des Sciences,* v. 234, May 26, 1952, p. 2200-2202.

Proposes use of films formed on polished metal surfaces during oxidation or sulfuration for surface investigations. Micrographs illustrate typical results. (N5, M23, Fe)

215-N. (French.) **Theory of Order-Disorder Modifications in $AuCu_3$ Alloys.** Gérard Fournet. *Comptes Rendus hebdomadaires des Séances de l'Academie des Sciences,* v. 234, May 19, 1952, p. 2049-2051.

The Yvon theory. Theoretical findings show satisfactory agreement with practical results. The method outlined for study of order-disorder transformations makes it possible to predict quantitatively ordering phenomena at a small distance from experimental data for a large distance. Gives a new example of a relation between intensity of diffuse X-rays to energies of interaction between atoms. Experimental data for 400, 460, and 550° C. are tabulated. (N10, Au, Cu)

216-N. (French.) **Contribution to the Study of Aging of Mild Steel.** J. A. Lemoine and A. Sariban. *Revue de la Soudure; Lastijdschrift,* v. 8, No. 2, 1952, p. 84-104.

Aging by cold-working, aging after quenching, and some experimental results. Tables contain results on cold worked and quenched samples. Proposes a new method for measuring aging. 12 ref. (N7, J27, CN)

217-N. (German.) **Initiation Period of the Austenite Transformation With Various Types of Cooling.** Franz Wever and Otto Krisement. *Archiv für das Eisenhuttenwesen,* v. 23, May-June 1952, p. 229-237.

Various methods for plotting the time-temperature-transformation diagram. Aspects of this diagram, and results for different types of steels compared with experimental findings. Data are tabulated and charted. 10 ref. (N8, ST)

218-N. (English.) **Growth Spirals and Polytypism of Silicon Carbide Crystals.** Ajit Ram Verma. *Zeitschrift für Electrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Apr. 1952, p. 268-274.

The different growth features observed on the faces of SiC crystals can be divided into growth spirals, which are of three types: elementary spirals; oriented overgrowths; holes, hollows, and spots. 10 ref. (N12, M26, Si, C-n)

219-N. (German.) **Nucleus Formation and Growth of Crystals in Solid Metals.** W. G. Burgers. *Zeitschrift für Electrochemie; Berichte der Bunsen-*

gesellschaft für physikalische Chemie, v. 56, Apr. 1952, p. 318-323.

Experiments concerning nucleus formation and nature of the nuclei in recrystallization of deformed metal specimens. Reviews theoretical considerations on the basis of the literature. Micrograms and diagrams. 48 ref. (N2, N12)

220-N. (German.) **Diffusion of Metals in Sintered Al Specimens.** W. Seith and G. Löpmann. *Zeitschrift für Electrochemie; Berichte der Bunsengesellschaft für physikalishe Chemie,* v. 56, Apr. 1952, p. 373-379; disc., p. 379.

Investigation of a new Al sintered material "SAP"; and on diffusion of Ag, Cu, Mg, Si, and Zn in it. Experiments in which the contacting surfaces were subjected to preliminary electrolytic oxidation. Micrographs. (N1, Al)

221-N. (German.) **Investigations by Means of Radioactive Indicators of Exchange and Diffusion Processes in Silver Electrodes.** Heinz Gerischer and Wolf Vielstich. *Zeitschrift für Electrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Apr. 1952, p. 380-386; disc., p. 386.

Experiments on the exchange between Ag metal and Ag ions by means of Ag^{110}. Experimental arrangement. Results, based on kinetic analysis of the process. Tables and graph. (N1, Ag)

222-N. (Russian.) **Problems of the Kinetics of Graphitization of Cast Iron.** K. P. Bunin and I. V. Salli. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Apr. 21, 1952, p. 841-842.

The formation of graphite in cast iron was studied by vacuum annealing at 950° C., and by microscopic examination. (N8, CI)

223-N. (Russian.) **Stress Fields Arising During Decomposition of Solid Solutions Near Spherical Nuclei of a New Phase.** L. N. Aleksandrov and B. Ia. Luibov. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Apr. 21, 1952, p. 833-835.

A theoretical discussion with emphasis on the austenite-ferrite transformation of low-carbon steels. (N8, CN)

224-N. **Segregation of Iron and Phosphorus at the Grain Boundaries in 70:30 Brass During Grain Growth.** H. M. Miekk. *Journal of the Institute of Metals,* v. 80, June 1952, p. 569-576.

Effects of P, of Fe, and of P + Fe on grain size and hardness; correlation between hardness and grain size; and grain size vs. temperature for different critical amounts of P and Fe. Theory. Graphs. 19 ref. (N3, Q29, Cu)

225-N. **The Theory of Precipitation Hardening.** R. L. Apps. *Journal of the Birmingham Metallurgical Society,* v. 32, June 1952, p. 60-72.

Qualitative review illustrated with diagrams. 18 ref. (N7)

226-N. **Transformations in Copper Alloys.** *Metal Progress,* v. 62, July 1952, p. 150, 152. (Condensed from "Thermo-Elastic Analysis of Transformations in Copper Alloys", R. Cabarat, P. Gence, L. Guillet, and R. LeRoux.)

Previously abstracted from *Journal of the Institute of Metals.* See item 209-N, 1952. (N6, Q21, Cu)

227-N. **Related Diffusion Effects of Carbon and Sulphur in Iron at High Temperatures.** K. J. Irvine. *Journal of the Iron and Steel Institute,* v. 171, June 1952, p. 142-147.

Experiments on the penetration of iron sulfide into Armco iron in CO, H_2, or N_2 atmospheres at 1000°; similar experiments with Ni, Cu, Monel metal, and plain carbon steel; and experiments on the relative movement of C and S at high temperatures. The last tests involved carbon steel in CO and in N_2; and free-cutting steel in N_2. The melting of large sulfide particles is considered. Comparison with earlier results and industrial implications. Photomicrographs. (N1, P12, Fe, Ni, Cu, CN)

228-N. **Effects Associated With the Flow of Vacancies in Intermetallic Diffusion.** R. S. Barnes. *Proceedings of the Physical Society,* v. 65, sec. B, July 1, 1952, p. 512-525.

Experiments on the interdiffusion of alpha brass and Cu-Ni couples and sandwiches have shown that there is an increase of volume in the diffusion zone as a result of diffusion. A theory is postulated to explain the volume increase. Tables and diagrams. (N1, Cu, Ni)

229-N. **Diffusion in Alloys and the Kirkendall Effect.** J. Bardeen and C. Herring. "Imperfections in Nearly Perfect Crystals" (John Wiley & Sons, New York), 1952, p. 261-288.

The phenomenological theory of diffusion in a two-component system is formulated more rigorously than heretofore, and it is shown that diffusion currents due to a composition gradient can always be described in terms of two effective diffusion constants, one for each component, provided lattice defects remain everywhere in equilibrium. The detailed atomic mechanism of transport is considered for the special case of diffusion by lattice vacancies. Effectiveness of dislocations in holding the vacancy concentration at its equilibrium value, and some

suggestions regarding atomic nature of the plastic flow which takes place in the Kirkendall effect. (N1)

230-N. Theory of Diffusion. Clarence Zener. "Imperfections in Nearly Perfect Crystals" (John Wiley & Sons, New York), 1952, p. 289-314.

Refers to solid-state diffusion. The magnitude of D_o for chemical diffusion indicates whether the elementary act of diffusion occurs homogeneously throughout the matrix or is confined to short-circuiting paths arising from imperfections. The frequently found abnormally low D_o in chemical diffusion is attributed to short-circuiting diffusion paths either along grain boundaries or along a continuous network of solute atoms. Conditions under which D_o should have a normal order of magnitude. 44 ref. (N1)

231-N. Movement and Diffusion Phenomena in Grain Boundaries. R. Smoluchowski. "Imperfections in Nearly Perfect Crystals" (John Wiley & Sons, New York), 1952, p. 451-471; disc., 472-475.

Experimental data for Ag, Al, and brass are in agreement with theoretical calculations of mobility due to surface tension in a curved boundary. Physical factors such as surface energy, state of strain, external stresses, time and temperature, and relative orientation, and their influence on the mobility of grain boundaries. Thickness of specimen and grain size, together with infiuence of obstacles and impurities on mobility of grain boundaries. Mechanism of grain-boundary diffusion from the point of view of current theories of volume diffusion. The experimental results, and their interpretation. Influence of relative orientation of grains and grain boundary on diffusion. 30 ref. (N1)

232-N. (French.) **Refining and Tempering of 4% Al-Cu, Al-Cu-Mg, and Al-Cu-Mg-Si High-Purity Alloys.** A. Saulnier and R. Syre. *Revue de Métallurgie,* v. 49, Jan. 1952, p. 1-19; disc., p. 20-21.

Structural hardening with respect to theories of precipitation, objections to these theories, isothermal hardening of high purity 4% Al-Cu alloys, isothermal expansion, influence of Mg on Al-Cu alloys, hardening of Al-Cu-Mg alloys, etc. Micrographs, tables, and graphs. 23 ref. (N7, J27, Al)

233-N. (French.) **Study of the Recrystalization of Three High-Purity Aluminums With the Aid of Their Mechanical Properties.** B. Nauton. *Revue de Métallurgie,* v. 49, June 1952, p. 453-457.

Influence of minute traces of impurities on the temperature of recrystalization. Experimental details. Tables, charts, and micrographs. (N5, Q general, Al)

234-N. Age Hardening of Aluminum-Silver Alloys. I. Measurement of Hardness and the Limit of Elasticity. Werner Köster and Franz Braumann. **II. Measurement of Electric Conductivity and Thermoelectric Force.** Werner Köster, Horst Steinert, and Johannes Scherb. *Zeitschrift für Metallkunde,* v. 43, June 1952, p. 193-207.

Part I: Hardness and elasticity of 6, 10, 20, and 38% Ag. Establishment of a metastable balance in cold hardening. The influence of quenching stresses on the kinetics of age hardening and its retrogression. Part II: Effect of time on electric conductivity and thermo-electric force of an alloy containing 38% Ag. Data are tabulated and charted. 40 ref. (N7, Q21 Q29, P15, Al, Ag)

235-N. (German.) **Kinetics of the Age Hardening of Aluminum-Silver Alloys. III. Radiographic Investigation of the Age Hardening Process.** Richard Glockner, Werner Köster, Johannes Scherb, and Günther Ziegler. **IV. The Atomic Arrangement in Interference Regions of an Age Hardened Aluminum-Silver Alloy.** Günther Ziegler. *Zeitschrift für Metallkunde,* v. 43, June 1952, p. 208-216.

Part III: Radiographic investigations on an Al-Ag alloy containing 38% Ag. Purpose of investigations was to coordinate the occurrence of Guinier-Preston bands with kinetic curves. Experimental details. Results are tabulated and illustrated by radiographs. Part IV: Atomic arrangement in agreement with lattice structure appearing in radiographs of the initial stages of age hardening of Al-Ag alloys at low temperatures. Diagrams. 28 ref. (N7, P10, Al, Ag)

236-N. (German.) **Thermodynamics of Cold Age Hardening.** Ulrich Dehlinger and Helmut Knapp. *Zeitschrift für Metallkunde,* v. 43, June 1952, p. 223-227.

The complex conditions arising in supersaturated mixed metallic crystals. Treats particularly negative diffusion and the problem of thermodynamic instability. Theoretical and mathematical. 10 ref. (N1, P12)

237-N. (German.) **Investigation on the Disintegration of Potassium Chloride Sodium Chloride Mixed Crystals.** Erich Scheil and Hans Stadelmaier. *Zeit-*

schrift für Metallkunde, v. 43, June 1952, p. 227-236.

The production of salt crystals, and measurement of their clouding during disintegration. Dependance of the clouding constant on wave length. Phenomena of disintegration of above crystals compared to similar phenomenon in alloys. Graphs and diagrams. 18 ref. (N12)

238-N. (Russian.) **Calculation of the Rate of Growth of Nuclei of New Phases During Phase Transformation in a Single-Component System.** B. Ia. Liubov. *Doklady Akademii Nauk SSSR,* new ser., v. 84, May 11, 1952, p. 277-279.

Mathematical analysis and graphical interpretation. (N2)

239-N. On Diffusionless Transformation in Au-Cd Single Crystals Containing 47.5 Atomic Percent Cadmium: Characteristics of Single-Interface Transformation. Lo-Ching Chang. *Journal of Applied Physics,* v. 23, July 1952, p. 725-728.

Kinetics of single-interface motion. Tables and graphs. (N1, Au, Cd)

240-N. Grain Boundary Diffusion of Zinc in Copper. R. Flanagan and R. Smoluchowski. *Journal of Applied Physics,* v. 23, July 1952, p. 785-787.

In continuation of a previous study of grain-boundary diffusion of Ag in Cu, the diffusion of Zn along grain boundaries of columnar Cu was investigated at various temperatures. Results confirm the influence of angle between the grains on diffusion and indicate an angular dependence of activation energy. (N1, Zn, Cu)

241-N. A Note on the Formation of Undercooled Graphite in High-Purity Iron-Carbon-Silicon Alloys. W. S. Owen. *Journal of the Iron and Steel Institute,* v. 171, July 1952, p. 237-238.

Formation of undercooled graphite in vacuum-melted high-purity Fe-C-Si alloys is a result of the decomposition of an undercooled austenite-carbide complex. Explanation of the phenomena is suggested in general terms. Photomicrographs. (N8, Fe, CI)

242-N. A Mechanism for Sputtering in the High Vacuum Based Upon the Theory of Neutron Cooling. Frank Keywell. *Physical Review,* ser. 2, v. 87, July 1, 1952, p. 160-161.

A Phillips ion-gage discharge was used as a source of ions to measure absolute sputtering ratios (number of atoms sputtered per incident ion) for Ag metal bombarded by ions. Mechanism and circuit diagram of apparatus. (N15, Ag)

243-N. (English.) **On the Lattice Vibrations of a Binary Superlattice Alloy.** Yoshio Shibuya, Yoshiichi Fukuda, and Tadao Fukuroi. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Feb. 1951, p. 1-12.

Results of a theoretical calculation of the vibrational modes of a β-brass alloy (Cu-Zn) for the state of any degree of order in accordance with the method of Born and von Karman. The 6th order secular equation obtained was solved with respect to the three principal directions (100), (110), and (111). The ν-σ curves for the state of several specified values of degree of order in the three principal directions are plotted. (N10, Cu, Zn)

244-N. (English.) **The Behaviours of Fe-Al, Fe-Si and Fe-Al-Si Alloys Considered from the Standpoint of Ferromagnetic Superlattice. I. On the Superlattice Formation in Fe-Al Alloys.** Hiroshi Sato. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Feb. 1951, p. 13-23.

Anomalous properties in superlattice formation in solid solutions of Fe-Al system were theoretically deduced by taking into account the interrelation between formation of ordered atomic arrangement and origination of spontaneous magnetization. The phase diagram for superlattice formation in these binary alloys was also reviewed from this general point of view. (N10, P16, Fe, Al, Si)

245-N. (English.) **Study on the Superlattices of Ternary Alloys by X-Ray.** Shiro Ogawa and Yoshinobu Matsuzaki. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Feb. 1951, p. 50-54.

The ternary system Fe-Al-Si, which contains the industrially important ferromagnetic alloy "Sendust" and has two superlattices of the same type on the Fe-Al and Fe-Si sides; and offers various problems in connection with superlattice theory. The composition range in which the superlattice of the 3:1 type can exist was investigated. The results showed that all ferromagnetic singularities were found in this composition range. (N10, P16, Fe, Al, Si, SG-n, p)

246-N. (English.) **On the Magnetometric Studies of Transformation in Pure Manganese.** Mitsutake Isobe. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Feb. 1951, p. 78-81.

Transformation points in pure distilled Mn were magnetometrically investigated by the modified Weiss

method. It was found that the Mn had four phases, α, β, γ and δ, in the solid state; and that the three transformation points were 702, 1065, and 1138° C., respectively. The behaviors of these transformations were also clarified. (N6, Mn)

247-N. (English.) **On the Production of Single Crystals of Zinc, Bismuth and Tin by Sucking up From Their Melts.** Mikio Yamamoto and Jiro Watanabe. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Apr. 1951, p. 165-174.

Effect of growing conditions upon percentage of success and orientations of single crystals produced. (N12, Zn, Bi, Sn)

248-N. (French.) **The Phenomenon of Pre-Precipitation in Aluminum-Silver Alloy.** Christopher B. Walker and André Guinier. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, June 9, 1952, p. 2379-2381.

Proposes a new and more accurate model for interpretation of Al-Ag alloys in their first stage of aging. Diffusion diagrams at various annealing temperatures. (N7, Al, Ag)

249-N. Theory of Grain Boundary Diffusion. R. Smoluchowski. *Physical Review,* ser. 2, v. 87, Aug. 1, 1952, p. 482-487.

The previously proposed dependence of structure of grain boundaries upon angle of disorientation of the two grains is used as a basis of a quantitative consideration of diffusion along grain boundaries and in particular of apparent activation energies. At small angles in the dislocation range, diffusion is controlled by a volume-diffusion mechanism. At high angles near 45°, the model of a uniform grain boundary is applicable. In the intermediate range, an array of rod-like areas of distorted lattice leads to low or even negative apparent activation energies. Theory is in good agreement with experiment. 12 ref. (N1)

250-N. The Growth From the Melt of Single Crystals of Low Melting Point Metals. A. J. Goss and S. Weintroub. *Proceedings of the Physical Society,* v. 65, sec. B, Aug. 1, 1952, p. 561-571; disc., p. 571-572.

Experiments on preparation of Sn, Pb, Zn, and Bi single crystals in the form of rods. Effects on crystallization of temperature gradient and rate of growth. Tables and graphs. (N12, Sn, Pb, Zn, Bi)

251-N. Stimulated Crystals, Twinning and Rate of Nucleation During Recrystallization of Aluminium. J. Sandee, W. May, and W. G. Burgers. "Selected Topics in X-Ray Crystallography From the Delft X-Ray Institutes" (Interscience Publishers, New York), 1951, p. 161-170.

Correlates and critically discusses observations reported in the literature. 18 ref. (N5, Al)

252-N. (German.) **Diffusion in Solid Metals.** W. Seith and A. Kottmann. *Angewandte Chemie,* v. 64, July 21, 1952, p. 379-391.

The connection between partial diffusion coefficients determined by radioactive methods and chemical partial diffusion coefficients determined from shifting of markers is experimentally verified. Changes in shape and dimension and occurrence of cavities caused by the process of diffusion were examined in the systems Ni-Cu, Ag-Pd, and Fe-Ni. The diffusion mechanism in metallic mixed crystals in connection with the experimental results. Photomicrographs, tables and graphs. 21 ref. (N1, Ni, Cu, Ag, Au, Pd, Fe)

253-N. The Electrolytic Separation and Some Properties of Austenite and Sigma in 18-8-3-1 Chromium-Nickel-Molybdenum-Titanium Steel. T. P. Hoar and K. W. J. Bowen. *American Society for Metals,* Preprint 4, 1952, 19 pages.

Experimental technique and results. Transformations of extracted and massive austenite are compared. Ferromagnetic properties at low temperatures, compositions, and electrode potentials of the two varieties, are also compared. (N8, P15, P16, SS)

254-N. Recrystallization and Grain Growth in Alpha Brass. S. L. Channon and H. L. Walker. *American Society for Metals,* Preprint 8, 1952, 20 pages.

Cold rolled commercially pure 70-30 cartridge brass samples of different initial grain sizes were annealed isothermally at various temperatures for various times. Recrystallized grain size was found to be independent of temperature of annealing, and was related to the degree of deformation by an empirical equation. 20 ref. (N5, N3, Cu)

255-N. The Effect of Composition on the Temperature of Spontaneous Transformation of Austenite to Martensite in 18-8 Type Stainless Steel. G. H. Eichelman, Jr., and F. C. Hull. *American Society for Metals,* Preprint 9, 1952, 19 pages.

Determined by dilatometric measurements. It can be expressed by a simple linear equation. Relative effectiveness of the additions, in their normal composition ranges, in lowering the M_s temperature increases

in the following order: Si, Mn, Cr, Ni, C, and N_2. M_s changes caused by carbide precipitation can be used as a sensitive means for determining solubility of C in stainless steel. (N8, SS)

256-N. The Order-Disorder Transformation Viewed as a Classical Phase Change. F. N. Rhines and J. B. Newkirk. *American Society for Metals,* Preprint 12, 1952, 18 pages.

The question of whether order-disorder transformations are normal Gibbsian phase changes, or are 2nd-order transformations, is reviewed by re-examination of published evidence and by new resistivity and X-ray diffraction observations on Cu-Au and Cu-Zn alloys. All of the evidence supports the view that order-disorder transformations are normal phase changes. (N10, Cu, Au, Zn)

257-N. The Martensite Transformation Temperature in Titanium Binary Alloys. Pol Duwez. *American Society for Metals,* Preprint 35, 1952, 7 pages.

The temperature was measured in binary alloys of Ti with Cb, Ta, W, Fe, Cr, and Mn. The critical concentration above which the β-structure is retained after quenching in the above-mentioned binary alloys is discussed in connection with results published by other investigators. 13 ref. (N9, Ti, Cb, Ta, W, Fe, Cr, Mn)

258-N. Formal Basis for Diffusion Theory. L. S. Darken. *American Society for Metals.* "Atom Movements", 1951, p. 1-25.

Fick's law for the cases where the diffusitivity is a constant and for more complicated binary systems. Multicomponent systems; the current binary system method is not applicable to these. Some data on diffusion of C in Fe-C alloys; in the Ni-Cu system; and in the Au-Ni; Au-Pd; and Au-Pt systems. Diagrams and graphs. 36 ref. (N1, Fe, Ni, Au, Pd, Pt, Cu)

259-N. Chemical Techniques and Analysis of Diffusion Data. Cyril Wells. *American Society for Metals.* "Atom Movements", 1951, p. 26-50.

Chemical, spectroscopic, and vacuum-fusion methods used in securing diffusion data. How to obtain maximum amount of precise information. Examples discussed from the literature include diffusion data on: Zn in α-brass; carbon steel; Cu-α-brass; Fe-steel; carburized Fe; boron steel; H-Fe; and Mo and inert markers in brass. Graphs, diagrams, and tables. 30 ref. (N1)

260-N. Tracer and Other Techniques of Diffusion Measurements. R. E. Hoffman. *American Society for Metals.* "Atom Movements", 1951, p. 51-68.

The tracer technique and several other physical methods most applicable to the problems of the practicing metallurgist. Diagrams and photomicrographs. 86 ref. (N1, S19)

261-N. Mechanisms of Diffusion. H. B. Huntington. *American Society for Metals.* "Atom Movements", 1951, p. 69-86.

Diffusion in metals in the solid state. Mechanism in interstitial alloys and three possible mechanisms for substitutional alloys: direct interchange, interstitialcies, and vacancies. Examples from the literature. Diagrams. 33 ref. (N1)

262-N. Diffusion in Alloys and the Kirkendall Effect. J. Bardeen and C. Herring. *American Society for Metals.* "Atom Movements", 1951, p. 87-111.

Thermodynamics; phenomenological equations for vacancy diffusion; kinetic theory; and sources and sinks for vacancies (with example from a brass-Cu couple). Appendixes on relation of diffusion coefficients for a tracer; and for mass transport and distribution of atoms in multicomponent systems. Diagrams. 29 ref. (N1, P12, Cu)

263-N. Volume Diffusion—An Empirical Survey. C. E. Birchenall. *American Society for Metals.* "Atom Movements", 1951, p. 112-128.

Selective survey of results of volume diffusion measurements from an empirical point of view indicating some correlations and pointing out where additional data might help to settle critical theoretical questions. Defines volume diffusion, and considers the selected results for a variety of metals and nonmetals under the headings of structure, temperature, and concentration dependence. Graphs, tables, and photomicrographs. 45 ref. (N1)

264-N. Grain Boundary and Surface Diffusion. D. Turnbull. *American Society for Metals.* "Atom Movements", 1951, p. 129-152.

Analyses of the diffusion process for D_B, $D_S > D_l$, and the data and conclusions bearing on the interrelations between these diffusion coefficients. Literature data on various metals. Diagrams and tables. 43 ref. (N1)

265-N. Diffusion and High Temperature Oxidation of Metals. Carl Wagner. *American Society for Metals.* "Atom Movements", 1951, p. 153-173.

Review confined to the mechanism of diffusion processes in bulk layers. Literature data on sulfides, ox-

ides, halides, and selenides of various metals. Tables and diagrams. 74 ref. (N1, R2)

266-N. Gas-Metal Diffusion and Internal Oxidation. F. N. Rhines. *American Society for Metals.* "Atom Movements", 1951, p. 174-191.

A review. Distinguishing features of gas-metal diffusion and main experimental facts, especially recent observations. Considers various metals, H_2, O_2, N_2, the noble gases, and the halogen gases. Micrographs, graphs, and diagrams. 26 ref. (N1, R2)

267-N. The Migration of Grain Boundaries. J. E. Burke. *American Society for Metals.* "Atom Movements", 1951, p. 209-232.

Migration of boundaries between metal domains which differ primarily in crystallographic orientation. The driving forces which are operating and variables affecting the rate of migration. Grain-boundary structure. 51 ref. (N1, M27)

268-N. Summary. Robert F. Mehl. *American Society for Metals.* "Atom Movements", 1951, p. 233-240.

A commentary on the 11 papers (abstracted separately) presented at the 32nd National Metal Congress and Exposition, Chicago, Oct. 21-27, 1950. Covers migration of grain boundaries, diffusion, and relation of latter to oxidation and sintering. (N1, R2, H15)

269-N. A Note on the Graphitization of Martensite. J. W. Grant. *British Cast Iron Research Association Journal of Research and Development,* v. 4, Aug. 1952, p. 366-368.

Results of tests to investigte formation of graphite nodules from martensite, following heat treatment, in prequenched specimens of nodular and flake graphite irons. (N8, CI)

270-N. The Cubic-Tetragonal Transformation in Manganese-Copper Alloys. Z. S. Basinski and J. W. Christian. *Journal of the Institute of Metals,* v. 80, Aug. 1952, p. 659-666.

Mn-rich Mn-Cu alloys were investigated by X-ray and microscopic methods. Etched microspecimens of tetragonal alloys show a banded structure, which is also produced by heating and cooling electropolished specimens through the transformation range. Some difficulties in connection with possible dislocation theories of the actual atom movements are indicated. 19 ref. (N6, Mn, Cu)

271-N. Some Effects of Order-Disorder in Iron-Aluminium Alloys. W. D. Bennett. *Journal of the Iron and Steel Institute,* v. 171, Aug. 1952, p. 372-380.

Influence of varying degrees of order on magnetic and electrical properties of an alloy. Fe_3Al was used because it is magnetic, has a high electrical resistivity, and can readily be ordered or disordered by heat treatment. Graphs. 11 ref. (N10, P15, P16, Fe, Al)

272-N. Recrystallization Kinetics of Low Carbon Steel. Stanley F. Reiter. *Journal of Metals,* v. 4, Sept. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 972-979.

Isothermal recrystallization curves for 0.08 and 0.15% C steel at subcritical temperatures following small amounts of plastic deformation. Effects of deformation, temperature, and aging on nucleation and growth rates; and free energy of activation for grain-boundary migration in steel. Micrographs, graphs, and tables. 16 ref. (N5, CN)

273-N. Do Metals Recrystallize? Paul A. Beck. *Journal of Metals,* v. 4, Sept. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 979-980.

See abstract from *American Society for Metals,* "Metal Interfaces", item 193-N, 1952. (N5)

274-N. Effect of Cold Work on Sigma Formation. E. J. Dulis and G. V. Smith. *Metal Progress,* v. 62, Sept. 1952, p. 86-87.

Relationships between quantity of sigma phase, cold work and hardness in 25-20 Cr-Ni and 18-8 Cb stainless. Photomicrographs show structure. (N8, SS)

275-N. Effect of Deformation on Transformation of Austenite to Martensite. *Metal Progress,* v. 62, Sept. 1952, p. 146, 148, 150, 152. (Translated and condensed from "Transformation of Deformed Austenite Into Martensite", G. V. Kurdyumov, O. P. Maksimova, and T. V. Tagunova, *Doklady Akademii Nauk SSSR).*

Previously abstracted from original. See item 248-N, 1950. (N8, AY)

276-N. Graphitization in Low-Carbon Steels. *Metal Progress,* v. 62, Sept. 1952, p. 180, 182. (Condensed from "Heterogeneous Nucleation of Graphite in Hypo-Eutectoid Steels", W. E. Dennis, *Journal of the Iron and Steel Institute,* v. 70, May 1952, p. 59-63).

Previously abstracted from original. See item 179-N, 1952. (N2, N8, CN)

277-N. (German.) **Self-Diffusion on Copper Surfaces.** Erich Menzel. *Zeitschrift für Physik,* v. 132, No. 4, July 1952, p. 508-528.

Measurement of self-diffusion and effect of time, temperature, and air, hydrogen, and oxygen pressures. The surrounding atmosphere was found to have a very material effect on the results. Photographs, diagrams, and graphs. 33 ref. (N1, Cu)

278-N. (Russian.) **Saturation of Steel Surfaces by Molybdenum From Gaseous Media.** G. N. Dubinin. *Doklady Akademii Nauk SSSR,* new ser., v. 84, June 11, 1952, p. 935-938.

Experiments were used to study diffusion and the properties of Fe-Mo alloys. Data are tabulated and illustrated. Phase diagram and micrographs. 12 ref. (N1, M24, Fe, Mo)

279-N. (Russian.) **The Influence of Concentrated Stresses on Diffusion in Solid Solutions.** B. Ia. Liubov and N. S. Fastov. *Doklady Akademii Nauk SSSR,* new ser., v. 84, June 11, 1952, p. 939-941.

A mathematical discussion. (N1)

280-N. (Russian.) **Impregnation of Steel Surfaces With Manganese From Gaseous Media.** G. N. Dubinin. *Doklady Akademii Nauk SSSR,* new ser., v. 84, June 21, 1952, p. 1155-1158.

A study of Fe-Mn alloys was made by the above method using iron (0.03% C) and steel (0.1-1.2% C) specimens. Includes tabular data, phase diagram of the Fe-Mn system, and photomicrographs. (N1, M24, Fe, Mn)

281-N. (English.) **Crystal Growth and Dislocations.** F. C. Frank. *Zeitschrift für Elektrochemie; Berichte der Bunsengesellschaft für Physikalische Chemie,* v. 56, No. 5, 1952, p. 429-436; disc., p. 437-438.

Theoretical discussion. Examples of observations of various investigators. 21 ref. (N12)

282-N. (French.) **Formation and Development of Zones and Precipitates in Supersaturated Solid Solutions.** A. Guinier. *Zeitschrift für Elektrochemie; Berichte der Bunsengesellschaft für Physikalische Chemie,* v. 56, No. 5, 1952, p. 468-473.

Formation and growth of crystal nuclei of an Al + 4% Cu alloy as a good example of the precipitation hardening. Graphs, tables, diagrams, and photomicrographs. 10 ref. (N7, Al)

283-N. (Book.) **Atom Movements.** 240 pages. 1951. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $5.00.

Comprises 11 papers presented at a seminar during the 32nd National Metal Congress and Exposition, Chicago Oct. 21-27, 1950, sponsored by the American Society for Metals. Topics include migration of grain boundaries, diffusion, and relation of latter to oxidation and sintering. Individual papers and a summary are separately abstracted. Subject index. (N1)

284-N. **The Growth of Crystals of the Hexagonal Metals From Their Vapours.** A. J. Forty. *Philosophical Magazine,* ser. 7, v. 43, Sept. 1952, p. 949-957.

Techniques for preparation of well-developed growth surfaces of crystals of hexagonal metals Mg, Zn, Cd. Possibilities of performing plastic deformation experiments with these crystals. (N12, Q24, Mg, Zn, Cd)

285-N. **The Formation of Order in the Alloy $AuCu_3$.** I. G. Edmunds and R. M. Hinde. *Proceedings of the Physical Society,* v. 65, sec. B, Sept. 1, 1952, p. 716-730.

The approach to order in $AuCu_3$ was studied by X-ray examination of single crystals. Distribution of intensity in diffuse superlattice reflections was measured from a series of photographs of a stationary crystal, and again from a moving-film photograph, effect of instrumental broadening being eliminated by Stokes' method. Tables, diagrams, and graphs. 13 ref. (N10, Au, Cu)

286-N. (English.) **Calorimetric Study of the Precipitation of Carbon Dissolved in α-Iron.** G. Borelius and Stig Berglund. *Arkiv för Fysik,* v. 4, no. 1-2, 1952, p. 173-182.

Specimens of technically pure Fe with small C contents were heated at various temperatures between 350 and 700° C. in order to obtain the corresponding equilibrium between C in solution in α-Fe and in cementite, Fe_3C. They were then quenched to 0° C. During aging, the power of the heat evolved by precipitation of C as carbide was measured as a function of time and by integrating the power-time curves, the total amounts of heat were computed. Heat of solution and carbon solubilities. Tables and graphs. (N7, Fe)

287-N. (English.) **Study on the Recrystallization Temperature of Refined High Purity Aluminium. III. The Effect of Small Amounts of Impurities.** Namio Kawashima and Yuzo Nakamura. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 16, Jan. 1952, p. 26-29.

By means of X-ray analysis it was found that small addition of Cu, Mg, Zn, Si, Mn, and Ti within their solubility limit increased the beginning temperature of the recrystallization, but Fe lowered it. (N5, Al)

288-N. (German.) **Constitution Research as a Basis for the Heat Treat-**

ment of Steels. Adolf Rose and Peter Walter. *Stahl und Eisen,* v. 72, Aug. 28, 1952, p. 1063-1074; disc., p. 1074-1075.

Limited significance of equilibrium studies to hardening and heat treating of steels; representation of austenite transformation as dependent on time and temperature with undercooling; principal effect of carbon and alloying elements on transformation within pearlite and intermediate phases; and necessity for further fundamental research in order to determine relations between equilibrium and nonequilibrium conditions. Graphs and micrographs. 18 ref. (N8, ST)

289-N. (Japanese.) The Allotropic Transformation of Metallic Selenium. I and II. Sueo Yamamori. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 16, Jan. 1952, p. 1-10.

Experiments were conducted, using qualitative measurements of temperature dependence of conductivity, and by differential thermal analysis. In addition, electrical properties of monoclinic Se were studied. In Part II, conductivity of metallic Se was qualitatively investigated as a function of temperature of metallizing. It was found that there are different types of conductivity-temperature curves, the main difference between them being due to existence of the monoclinic modification mixed with hexagonal Se. Graphs and photomicrographs. (N6, P11, Se)

290-N. Self-Diffusion in Pure Polycrystalline Silver. L. Slifkin, D. Lazarus, and T. Tomizuka. *Journal of Applied Physics,* v. 23, Sept. 1952, p. 1032-1034.

A study using Ag^{110} as a tracer, over the range 450-936° C. Table and graphs. (N1, Ag)

291-N. The Kirkendall Effect in Alloy Systems. Herbert N. Hersh. *Journal of Applied Physics,* v. 23, Sept. 1952, p. 1055-1056.

Purpose of study was to investigate and determine nature of forces acting within diffusion zone which cause Kirkendall effect. Utilizes a dezincification of brass and measurement of dimensional changes. Table and graph. (N1, Cu)

292-N. Discussion at the Annual General Meeting, 1952: "Hydrogen in Steel". *Journal of the Iron and Steel Institute,* v. 172, Sept. 1952, p. 46-51.

Joint discussion on the following papers published in earlier issues of this journal: "The Determination of Hydrogen in Liquid Steel", R. M. Cook and J. D. Hobson; "Diffusion of Hydrogen in Iron and Iron Alloys at Elevated Temperatures", P. L. Chang and W. D. G. Bennett; "Distribution of Hydrogen in Large Ingots and Forgings", J. D. Hobson and C. Sykes; and "The Effect of Hydrogen on the Properties of Low-Alloy Steel," J. D. Hobson and C. Sykes. Diagrams. (N1, D9, Q general, ST, Fe, AY)

293-N. On the Reversal of the Strain-Induced Martensitic Transformation in the Copper-Zinc System. J. E. Reynolds, Jr., and M. B. Bever. *Journal of Metals,* v. 4, Oct. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 1065-1066.

Shows that martensitic transformations are thermally reversible, although hysteresis may be involved. Micrographs. (N9, Cu, Zn)

294-N. Diffusion of Silicon in Iron. W. Batz, H. W. Mead, and C. E. Birchenall. *Journal of Metals,* v. 4, Oct. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 1070.

Briefly describes experiments. (N1, Fe)

295-N. An Automatic Surface Follower for Measuring the Rate of Evaporation of Molten Metals Undergoing Vacuum Distillation. M. J. Spendlove and H. W. St. Clair. *Review of Scientific Instruments,* v. 23, Sept. 1952, p. 471-475.

Instruments which measure continuously rate of evaporation of molten metals at low pressure and measure temperature gradients near the evaporating surface. Schematic diagrams and graphs. (N12, M23)

296-N. Perfect Demarcation of the Diamond Crystal Structure in Germanium. S. A. Robinson, P. L. Ostapkovich, E. S. Schlegel, and C. P. Gazzara. *Science,* v. 116, Oct. 3, 1952, p. 362-364.

Arrangement of equipment permits observations of the top surface of molten Ge. Thus one can watch the Ge nucleate into the single crystal solid. Visible nucleation commences from the top and is associated with definite geometric patterns, which may be triangular, hexagonal, or diamond in nature, depending upon the plane of growth. (N12, Ge)

297-N. Superlattice Studies in the Systems Silver-Magnesium-Tin and Silver-Magnesium-Zinc. W. G. Henry and G. V. Raynor. *Canadian Journal of Physics,* v. 30, Sept. 1952, p. 412-421.

Diagrams, tables, and graphs. (N10, Ag, Mg, Sn, Zn)

298-N. Self-Diffusion at Silver Surfaces. W. C. Winegard and B. Chalmers. *Canadian Journal of Physics,* v. 30, Sept. 1952, p. 422-429.

Surface self-diffusion of Ag on specific crystallographic surfaces of Ag single crystals and on polycrystalline specimens was investigated. Various methods of surface preparation were used. The theory is advanced that "surface" diffusion takes place by a lattice-vacancy mechanism. Tables, graphs, and diagrams. 16 ref. (N1, Ag)

299-N. Further Observations on Dendritic Growth in Metals. F. Weinberg and Bruce Chalmers. *Canadian Journal of Physics,* v. 30, Sept. 1952, p. 488-502.

The direction of dendrite growth was determined as a function of crystallographic orientation for high-purity Sn and Zn, using a single-crystal decanting technique. Rate of dendrite growth in Pb; spacing between dendrite rows of a Pb crystal for varying amounts of supercooling. A mechanism of dendrite growth, compared with experimental observations. Micrographs and graphs. (N12, Sn, Zn, Pb)

300-N. Some Effects of Magnesium on the Formation of Graphite in a Solidifying Cast Iron. C. H. Hughes. *Foundry Trade Journal,* v. 93, Sept. 25, 1952, p. 349-356; Oct. 2, 1952, p. 385-391; Oct. 9, 1952, p. 417-420; disc., p. 420-423.

Hypotheses explaining mechanism of graphite formation and their limitations. Detailed differences between cooling curves of Mg-free and Mg-containing hypo-eutectic cast irons were determined experimentally, and samples of both types of Fe, quenched from closely spaced temperature intervals within and near solidification range, were examined microscopically. Oct. 2 issue: Observations on inoculated Mg-free irons, inoculated Mg-containing irons, and noninoculated Mg-free irons. Oct. 9 issue: Results of a study of centers of crystallization of the eutectic liquid and direct solidification of inoculated Mg-containing irons to austenite and graphite. Tables, graphs, and micrographs. 20 ref. (N8, E25, CI)

301-N. The Quench-Ageing of Iron. Anna L. Tsou, J. Nutting, and J. W. Menter. *Journal of the Iron and Steel Institute,* v. 172, Oct. 1952, p. 163-171.

Optical and electron microscopes were used to follow metallographic changes occurring during precipitation of C from a supersaturated solid solution in α-iron over a range of aging temperatures and times. Results show that precipitates form at random throughout the grains and then grow preferentially at subgrain boundaries; at this stage they have the structure of ε-iron carbide and are plate-like in shape. Tables and photomicrographs. 29 ref. (N7, Fe)

302-N. Carbide Segregation as Related to Tool and Die Life. Stewart G. Fletcher and David Hughes. *Metal Treating,* v. 3, Sept.-Oct. 1952, p. 6-8.

Describes causes and control of segregation in toolsteels. Tests used for its determination. Tables and photographs. (N12, TS)

303-N. (French.) Kinetics of Recrystallization of Aluminum. P. Laurent and M. Batisse. *Revue de Métallurgie,* v. 49, July 1952, p. 485-496; Aug. 1952, p. 593-612.

Reviews work of various investigators; experiments on sheets of 99.35 and 99.91% Al. Results of work on isothermal recrystallization as a function of temperature and of cold hardening. Influence of resaturation, and of annealing temperature, on recrystallization. Results are interpreted in the light of various theories and on the basis of the literature. Tables and graphs. 64 ref. (N5, Al)

304-N. (German.) Aluminum and Gas. Hans Kostron. *Zeitschrift für Metallkunde,* v. 43, Aug. 1952, p. 269-284.

A critical review on the basis of the literature. The Al-air equilibrium below and above the melting point, the state of dissolved H_2, the influence of alloying elements on H_2 absorption, diffusion in Al, and its effects. Data are tabulated and charted. (N12, N1, Al)

305-N. The Recovery of Polycrystalline Aluminium. J. A. Ramsey. *Journal of the Institute of Metals,* v. 81, Oct. 1952, p. 61-66.

X-ray examination showed that only a few grains in a polycrystalline specimen recovered to a great extent: the majority recovered only partially. Microscopic examination revealed that recovery depended on the presence of kink bands, the degree of recovery in a given grain being contingent on closeness of packing of kink bands. Interpretation of results is given in terms of a dislocation hypothesis. Micrographs. 15 ref. (N4, Al)

306-N. The Solid Solubility of Silver in Aluminium. L. Rotherham and L. W. Larke. *Journal of the Institute of Metals,* v. 81, Oct. 1952, p. 67-71.

Solid-solubility curve of pure Ag in super-pure Al containing up to 8% Ag was determined by micro-

scopic examination and electrical resistance measurements. Over the range investigated, the two methods agree substantially. Resistance measurements provide a very sensitive means of detecting small structural changes. Photomicrographs and graphs. (N12, Ag, Al)

307-N. Diffusion of Zinc in Alpha Brass. G. P. Chatterjee. *Transactions of the Indian Institute of Metals,* v. 4, 1950, p. 255-268; disc., p. 269.

Diffusion characteristics of an element (particularly those with comparatively high vapor pressures) in a binary alloy may be determined from rate of loss of that element when heated at different temperatures in vacuum. Diagram, graphs, and tables. 13 ref. (N1, Cu, Zn)

308-N. Diffusion of Hydrogen in Steel. U. V. Bhat. *Transatcions of the Indian Institute of Metals,* v. 4, 1950, p. 279-286; disc., p. 287-289.

Apparatus for measuring volume of cathodically produced H_2, diffusing through a cylindrical wall of a steel specimen of a uniform thickness. Effects of grain size, composition, and structure. Diagrams, graphs, and tables. (N1, ST)

309-N. (German.) **Crystallization and Ingotism in Solidifying Al-Cu-Mg Melts.** W. Rosenkranz. *Metall,* v. 6, Oct. 1952, p. 597-608.

Research on the causes of shifting concentration in Al-Cu-Mg alloy shows a clear correlation between segregation and crystallization. Graphs, X-ray pictures, and micrographs illustrate the effects of different cooling conditions on structure of the ingot. (N12, Al)

310-N. (German.) **The Effect of the Elements on the Polymorphic Transformation of Cobalt.** Werner Köster. *Zeitschrift für Metallkunde,* v. 43, Sept. 1952, p. 297-303.

Study reveals that alloying elements reduce or increase the temperature of the A_r and A_e transformation of Co, depending on the position of the element in the periodic system. Results show a clear periodicity of effects with atomic number of the element. Data are compared with F. Wever's statements on the γ-α transformation of iron. Tables and graphs. 26 ref. (N6, Co)

311-N. (German.) **The Metallography of Light Metals. IV. The Crystallization of the Residual Melt in Commercial Aluminum Alloys.** Hans Kostron and Margarete Schippers. *Zeitschrift für Metallkunde,* v. 43, Sept. 1952, p. 303-306.

Results indicate that orientation of the α phase in the eutectic areas of Al-Zn-Mg-Cu alloys has no regular relationship to orientation of the intermetallic compound phase. Photomicrographs. (N12, M26, Al)

312-N. (German.) **The Effect of Ag, Au, Cd, Ga, In, Ge Bi, Se, and Te on the Polymorphic Transformation of Cobalt.** Werner Köster and Elizabeth Horn. *Zeitschrift für Metallkunde,* v. 43, Sept. 1952, p. 333-334.

The constitution diagram of Co is supplemented by determining the effects of above elements on the γ-ε transformation. Graphs. (N6, M24, Co)

313-N. (German.) **The Concept of Recrystallization in Metallurgy and Mineralogy.** Karl F. Chudoba. *Zeitschrift für Metallkunde,* v. 43, Sept. 1952, p. 337-338.

Differences in recrystallization of minerals and metals. Proposes that recrystallization as a mineralogical phenomenon be called "retrocrystallization". 14 ref. (N5)

314-N. Self-Diffusion in Alpha Iron Under Uniaxial Compressive Stress. F. S. Buffington and Morris Cohen. *Journal of Metals,* v. 4, Aug. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 859-860.

Results for body-centered high-purity cubic iron at a diffusion temperature of 890° C. The iron used was 99.97% Fe, principal impurities being 0.002% C, 0.003% O, and 0.02% Si. Surface-decrease method of self-diffusion analysis was employed, and Fe was tracer element. Specimens were loaded in compression between two quartz disks by means of a lever system operating through a vacuum seal. Results are charted and expressed by means of an empirical equation. (N1, Fe)

315-N. Segregation of Two Solutes, With Particular Reference to Semiconductors. W. G. Pfann. *Journal of Metals,* v. 4, Aug. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 861-865.

Simultaneous segregation of two solutes during directional solidification of an ingot is treated mathematically on basis of simplifying assumptions. Expressions are derived for difference in concentration of two solutes, and for location and concentration gradient of a *pn* barrier formed in a semiconductor by segregation of a donor and an acceptor. Examples for Ge. 11 ref. (N12, Ge)

316-N. Concentration Dependence of Diffusion Coefficients in Metallic Solid Solution. Donald E. Thomas and C. Ernest Birchenall. *Journal of Metals,* v. 4, Aug. 1952; *Transactions of the*

American Institute of Mining and Metallurgical Engineers, v. 194, 1952, p. 867-873.

Diffusion coefficients in Cu-Pd system were determined as a function of temperature and concentration. Concentration dependence is slight at both extremes of concentration and strong at intermediate concentrations. Diffusion coefficient approaches value of self-diffusion coefficient of Cu in dilute Pb solution. Redetermination of dependence of diffusion coefficients at the high-Cu end of the Cu-Ni system confirmed a strong dependence of diffusion coefficients on composition in relatively dilute solutions. Individual diffusion coefficients for Cu and Ni atoms were found by use of markers at 89.9% Cu. Graphs and tables. 23 ref. (N1, Cu, Pd, Ni)

317-N. Effect of Simultaneous Strain on Subgrain Growth. Jun Hino, Paul G. Shewmon, and Paul A. Beck. *Journal of Metals,* v. 4, Aug. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 873-874.

Recently, Wood and Scrutton found that rate of subgrain growth upon annealing increased very considerably if, simultaneously, a creep strain was applied at a low strain rate. Experiments on high-purity Al strip were carried out in order to confirm Wood and Scrutton's results by direct metallographic observation. Also, information was sought as to minimum creep strain necessary to produce this effect. Micrographs and diffraction patterns. (N3, Al)

318-N. Strain Ageing in Iron and Steel. J. D. Fast. *Philips Technical Review,* v. 14, Aug. 1952, p. 60-67.

Aging of steel, particularly mild steel, plastic deformation of metal, theoretical considerations on strain aging, strain-aging experiments with specially prepared commercial Fe alloys, effect of Mn, and blue brittleness. 10 ref. (N7, CN, Fe)

319-N. Preparation of Germanium Single Crystals. Louise Roth and W. E. Taylor. *Proceedings of the I.R.E.,* v. 40, Nov. 1952, p. 1338-1341.

Two methods for preparation in which a vacuum furnace with induction heating is used. Diagram and micrographs. 21 ref. (N12, Ge)

320-N. The Growth and Orientation of Single Crystals of Indium. A. J. Goss and E. V. Vernon. *Proceedings of the Physical Society,* v. 65, sec. B, Nov. 1, 1952, p. 905-906.

Method for In growth and determination of crystallographic orientation by optical etch-pit reflection methods. (N12, In)

321-N. Crystallography of Transformations. J. S. Bowles and C. S. Barnett. "Progress in Metal Physics. Vol. 3." (Interscience Publishers, New York), 1952, p. 1-41.

General review of and contribution to knowledge of atom movements accompanying transformations, in transforming material, in boundaries of transforming regions, and in surrounding matrix. Micrographs and diagrams. 90 ref. (N general, M26)

322-N. Recrystallization and Grain Growth. F. E. Burke and D. Turnbull. "Progress in Metal Physics. Vol. 3" (Interscience Publishers, New York), 1952, p. 220-292.

Theoretical investigation plus reviews of previous work. Graphs and micrographs. 110 ref. (N4, N5)

323-N. (French.) **Order - Disorder Transformations in Ternary Alloys.** Emile Josso. *Revue de Métallurgie,* v. 49, Oct. 1952, p. 727-732.

Dilatometric and thermomagnetic methods were used to study the above in ferronickel and ferrocobalt alloys, containing small amounts of Cu, Mo, and Cr. Data are charted. 15 ref.
(N10, Fe, Ni, Co, Fe-n)

324-N. (French.) **Some Characteristics of the Mechanism of Fusion.** G. C. Kuczynski. *Revue de Métallurgie,* v. 49, Oct. 1952, p. 733-735; disc., p. 735-736.

Wires of Cu, Ni, and Fe were wrapped around Cu cylinders. Metallographic studies were made to investigate diffusion between the two metals. Effects of vapor pressure were determined. (N1, Cu, Ni, Fe)

325-N. (Italian.) **Hardening of Alloys by Oxidation.** V. Gottardi. *Metallurgia Italiana,* v. 44, Aug.-Sept. 1952, p. 424-431.

Ag alloys, containing Al, Cd, Sb, or Mg-Cd, and Mg-Al were investigated. Diffusion of O_2, numerical values of diffusion and activation energies, rate of oxidation, and resulting hardening. Data are tabulated and charted. (N1, Q29, Ag)

326-N. (Italian.) **The Application of an X-Ray Spectrometer With Geiger-Müller Counter for Direct Determination of the Rate of Structural Changes.** U. Rösler and W. Ruff. *Metallurgia Italiana,* v. 44, Aug.-Sept. 1952, p. 475-487.

A new experimental and mathematical method demonstrated on an Al bronze, and showing transformations of β, β', β_1 α, and γ_2 phases. Graphs. (N6, M23, Cu)

SECTION P

PHYSICAL PROPERTIES and TEST METHODS

1-P. The Kinetics of the Dissolution of Zinc in Aqueous Iodine Solutions. L. L. Bircumshaw and A. C. Riddiford. *Journal of the Chemical Society,* Feb. 1951, p. 598-603; June 1951, p. 1490-1493.

The observed rate of dissolution is of first order with respect to iodine concentration and is directly proportional to apparent surface area of the Zn specimen over the range investigated. With the exception of specimens polished with rouge, method of preparation of the surface is without effect on rate. Part II: An increase in the concentration of KI produces a marked increase in the rate of dissolution of Zn in aqueous iodine solutions. (P13, R5, Zn)

2-P. Electrochemistry and the Science of Metals. Robert Piontelli. *Journal of the Institute of Metals,* v. 80, Nov. 1951, p. 99-107.

Historical account of the origin and growth of electrochemistry. The present state of knowledge on various aspects of electrochemistry that are closely related to metals. Particular attention to the bases of electromotive force. 25 ref. (P13, C23, L17)

3-P. Effect of Orientation on the Metallic Reflection of Polarized Light. D. H. Woodward and E. L. Bronson. *Nature,* v. 168, Oct. 27, 1951, p. 742-743.

The nature of three different types of anisotropic reflection. Investigation was carried out on etched monel metal, etched isotropic Al, and unetched anisotropic Be. (P17, Ni, Al, Be)

4-P. Anomalous Resistance of Noble Metals Containing Paramagnetic Ions. A. N. Gerritsen and J. Korringa. *Physical Review,* ser. 2, v. 84, Nov. 1, 1951, p. 604-605.

Experiments reported by Gerritsen and Linde on diluted alloys of Mn in Cu, Ag, and Au reveal anomalies which are similar but more pronounced than those observed in samples of "pure" noble metals. Theoretical explanation. (P16, Cu, Ag, Au)

5-P. The Saturation Magneto-Resistance of Iron-Aluminium Alloys. R. Parker. *Proceedings of the Physical Society,* v. 64, sec. B, Oct. 1, 1951, p. 930-931.

Measurements of resistivity and saturation magneto-resistance were made on two samples of iron containing 2.68 and 3.60% Al respectively, in the range 78-300° C. (P16, Fe)

6-P. Some Applications of Thermodynamics to Process Metallurgy. W. R. Moore. *Metallurgia,* v. 44, Oct. 1951, p. 194-195.

Application of thermodynamics in miscellaneous ferrous and nonferrous ore roasting and reduction processes. (P12, C general, D general)

7-P. Solubility of Gaseous Nitrogen in Gamma Iron and the Effect of Alloying Constituents—Aluminum Nitride Precipitation. L. S. Darken, R. P. Smith, and E. W. Filer. *Journal of Metals,* v. 3, Dec. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1174-1179.

Solubility of nitrogen-purified Fe and low-alloy steels was determined for the γ region (930°-1350° C.). The diffusivity of N_2 is estimated from the rate of approach to equilibrium. Investigations of Al-killed steels, held in N_2, disclose precipitation of AlN, the solubility of which is determined. 12 ref. (P13, N1, Fe, AY)

8-P. Effect of Varying the Rate of Reduction on the Magnetic Properties, Ultimate Tensile Strength, and Resistivity of 18/8 Stainless Steel Wire. Samuel Storchheim. *Journal of Metals,* v. 3, Dec. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1181-1183.

(P16, Q27, F28, SS)

9-P. Correlation Between Electrical Conductivity and Temperature Coefficient of Resistance of Solid-Solution Alloys. M. Hansen, W. R. Johnson, and John M. Parks. *Journal of Metals*, v. 3, Dec. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 1184-1189.

As part of a research project sponsored by the Signal Corps Engineering Laboratories, which has the objective of obtaining a magnet wire of good conductivity and low temperature coefficient of resistance, a comprehensive literature survey, supplemented by experimental work, revealed that a linear relationship exists for solid-solution alloys between the electrical conductivity and temperature coefficient. Data for Cu solid-solution alloys with P, Si, As, Sb, Al, Ni, Mn, Fe, Mg, Co, and Ti are charted, tabulated and correlated. 21 ref. (P15, Cu)

10-P. Vapor Pressures of Zinc Over AgZn Alloys. E. E. Underwood and B. L. Averbach. *Journal of Metals*, v. 3, Dec. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 1198-1202.

Vapor pressures were measured by the dew-point method. The thermodynamic activities of silver, and the molar heats of formation, were calculated. Similar measurements were made for the ternary alloys formed by adding Au to AgZn. An apparent particle-size effect was observed for AgZn filings. The vapor pressure of Zn over AgZn filings is 15-20% higher than over the solid alloys. 11 ref. (P12, Zn, Ag)

11-P. Surface Tension of Solid Silver. E. R. Funk, H. Udin, and J. Wulff. *Journal of Metals*, v. 3, Dec. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 1206-1208.

Measured by a refinement of the Udin, Shaler, and Wulff technique. The tests were made in a purified helium atmosphere at four different temperatures and various times. (P10, Ag)

12-P. Surface Tension of Solid Gold. F. H. Buttner, H. Udin, and J. Wulff. *Journal of Metals*, v. 3, Dec. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 1209-1211.

Using a modified Udin, Shaler, and Wulff technique, the surface tension of Au in purified helium was found to be 1400±65 dynes per cm. for the range 1017-1042° C. (P10, Au)

13-P. A Proposed Alternative Method for Measuring the Electrical Resistance of Pipe Line Coatings. J. K. Ballou, R. P. Howell, J. W. Liljeberg and P. F. Offermann. *Corrosion* (Technical Section), v. 7, Dec. 1951, p. 438-440.

Based on a method previously reported in *Corrosion*. (See item 225-P, 1951.) (P15, L26, ST)

14-P. The Magnetic Susceptibility of Zinc at Liquid Nitrogen Temperatures. J. W. McClure and J. A. Marcus *Physical Review*, ser. 2, v. 84, Nov. 15, 1951, p. 787-788.

The magnetic susceptibility of Zn parallel to the hexagonal axis was observed to be field dependent up to 85° K. The behavior at liquid nitrogen temperatures somewhat resembles the de Haas van Alphen effect with the amplitude of oscillation sharply decreased and the maxima and minima displaced in field strength. (P16, Zn)

15-P. Experiments With Audiofrequencies on Superconductors. B. Serin, C. A. Reynolds, J. R. Feldmeier, and M. P. Garfunkel. *Physical Review*, ser. 2, v. 84, Nov. 15, 1951, p. 802-805.

Experiments in which alternating and direct currents are superimposed on Sn wires in the superconducting state. Various anomalous behaviors can be traced to the a.c. skin effect, and it is concluded that experiments of this type are not suitable for determination of the relaxation time in the phase transition from superconducting to the normal states. (P15, Sn)

16-P. The Change in Electrical Resistance of Magnesium on Melting. F. Hubbard Horn. *Physical Review*, ser. 2, v. 84, Nov. 15, 1951, p. 855-856.

Describes an experiment. (P15, Mg)

17-P. The Anomalous Magnetoresistance of Bismuth at Low Temperatures. P. B. Alers and R. T. Webber. *Physical Review*, v. 84, Nov. 15, 1951, p. 863-864.

Results of investigation are compared with those previously found. (P16, Bi)

18-P. A Radial Heat Flow Apparatus for the Determination of Thermal Conductivity. A. C. Burr. *Canadian Journal of Technology*, v. 29, Nov. 1951, p. 451-457.

The apparatus was designed for routine measurement of thermal conductivity of materials in the range 0.001 to 0.1 c.g.s. units, but can be modified easily for measurements on metals or on refractory materials. Accuracy is estimated to be about ±5%. Data on Armco iron and petroleum coke are tabulated. (P11, Fe)

19-P. Ferromagnetic Resonance and the Internal Field in Ferromagnetic Materials. J. R. MacDonald. *Proceed-*

ings of the Physical Society, v. 64, sec. A. Nov. 1, 1951, p. 968-983.

Forces which influence the direction of the magnetization vector of a ferromagnetic substance in an external magnetic field, and effects of these forces upon some of the phenomena of ferromagnetic resonance. A macroscopic viewpoint is adopted throughout, and all microscopic interactions are replaced by formulas for the magnetic potential energy density of the materials which involve the macroscopic magnetization vector. 22 ref. (P16, SG-n, p)

20-P. The Effect of the Mean Free Path of Electrons on the Electrical Properties of Non-Metals. R. W. Wright. *Proceedings of the Physical Society*, v. 64, sec. A, Nov. 1, 1951, p. 984-999.

The theories of the mean free path of electrons in various types of materials, under various conditions. The conductivity, thermoelectric power, Hall coefficient, fractional change of conductivity in a magnetic field, and the Nernst, Ettinghausen, and Righi-Leduc coefficients are all calculated upon the Lorentz-Sommerfeld theory for the various mean-free-path theories. Experimental evidence is found in general to support the theory given, both in impurity metals and semiconductors, except perhaps in the case of the thermoelectric power. (P15)

21-P. Electrical Conductivity of Metals at Low Temperatures; Equilibrium Between Electrons and Phonons. P. G. Klemens. *Proceedings of the Physical Society*, v. 64, sec. A, Nov. 1, 1951, p. 1030-1039.

A mathematical resolution of difficulties found in two existing theories. (P15)

22-P. The Thermal Conductivity of Cadmium in a Magnetic Field at Low Temperatures. K. Mendelssohn and H. M. Rosenberg. *Proceedings of the Physical Society*, v. 64, sec. A, Nov. 1, 1951, p. 1057-1058. (P11, Cd)

23-P. A Photo-Conductive Effect in Tellurium Film. W. T. Blackband. *Nature*, v. 168, Oct. 20, 1951, p. 704.

Investigation shows that resistivity of a Te film decreases on exposure to sunlight. (P17, Te)

24-P. A New Calculation of the Cohesive Energy of Metallic Beryllium. B. Donovan. *Nature*, v. 168, Nov. 10, 1951, p. 836-837.

Compares results obtained with those previously calculated in the literature. (P10, Be)

25-P. Magnetic Properties, Internal Strains, and the Bauschinger Effect in Metals. N. H. Polakowski. *Nature*, v. 168, Nov. 10, 1951, p. 838.

Findings upon which a general rule is formulated stating that work softening occurs whenever the method of cold working used tends to produce an internal stress system different from that remaining after preceding treatment, irrespective of whether the latter was of mechanical or of thermal nature. (P16, Q24)

26-P. Change of Resistivity of Gold by Cold Working at Liquid-Air Temperature and Its Recovery by Temporary Heating. M. J. Druyvesteyn and J. A. Manintveld. *Nature*, v. 168, Nov. 17, 1951, p. 868-869.

Graph shows recovery of resistivity as a function of heating temperature. Resistivity decreases at +35 and −50° C. Stress-strain curve is not changed by heating. (P15, Q27, Au)

27-P. Adsorption of Water Vapour on Solid Surfaces. F. P. Bowden, and W. R. Throssell. *Proceedings of the Royal Society*, ser. A, v. 209, Nov. 7, 1951, p. 297-308.

Two methods are used, the first a direct weighing of the adsorbed film on a microbalance and the second an examination of polarized light reflected from the surface. Studies were made on Au, Pt, Ag, Al, and zinc blends. 26 ref. (P13)

28-P. The Thermal and Electrical Conductivity of Sodium at Low Temperatures. R. Berman and D. K. C. MacDonald. *Proceedings of the Royal Society*, ser. A, v. 209, Nov. 7, 1951, p. 368-375.

Modern theories of metallic conduction, based on the quantum interaction of electrons with the lattice vibrations, predict a considerable variation of Lorenz number and temperature. Measurements of the thermal and electrical conductivity of two pure specimens of sodium continuously from 90 to about 4° K. were made, and an experimental Lorenz curve derived. 22 ref. (P12, P15, Na)

29-P. The Melting Curve at High Pressures. C. Domb. *Philosophical Magazine*, ser. 7, v. 42, Nov. 1951, p. 1316-1324.

An attempt is made to derive theoretically the Simon formula for variation of the melting point of solid with pressure. The model used is similar to that of Lennard Jones and Devonshire, but interpretation of the results is different. A formula of the right type results, but a detailed examination shows that the melting temperatures are much too high. Reasons for the discrepancy are discussed. (P12)

30-P. Sintered Nickel Steels. (In German.) F. Benesovsky. *Berg und Hüttenmännische Monatshefte der Montanistischen Hochschule in Leoben,* v. 96, Sept. 1951, p. 184-187.

Investigation of density, hardness, tensile strength, elongation, and structure of sintered Ni steels containing 2-14% Ni and 0-0.7% C. See also abstract from *Powder Metallurgy Bulletin,* item 147-P, 1951. (P10, Q27, Q29, M27, AY)

31-P. Theory of the Absolute Thermoelectric Potential of Thin Metal Layers and Wires. (In German.) E. Justi, M. Kohler, and G. Lautz. *Zeitschrift für Naturforschung,* v. 6a, Oct. 1951, p. 544-550.

Experimental and theoretical study. Compares results with those obtained from vapor-deposited Pb and Bi layers in order to explain the conduction mechanism of the experimental specimens. Also discusses partially elastic reflection of electrons from the interior "surfaces" of the metal, and confirms the Wiedemann-Franz-Lorenz law with respect to thermal and electric conductivity. (P15, P11, Pb, Bi)

32-P. Metallurgical Considerations As a Basis of Chemical Equilibrium. (In Portuguese.) Werner Grundig. *Boletim da Associacao Brasileira de Metais,* v. 7, July 1951, p. 221-239.

Fundamental laws, reduction of minerals, absorption of gases in molten metals, and processes of degasification. (P12. P13)

33-P (Book) **Magnetic Materials.** Ed. 2. F. Brailsford. 156 pages. 1951. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $1.50.

The book might be subtitled: "Ferromagnetic Materials of Interest to the Electrical Engineer." The aim is to give the advanced student, the research worker, and those concerned with the technological applications of magnetic materials a comprehensive outline of the present state of knowledge of the subject. There seem to be only two references to articles published later than 1947. The coverage on commercial steels and alloys is extensive, even if far from complete. From review in *Chemical and Engineering News.* (P16, T1, SG-n, p)

34-P. Surface Chemical Phenomena in Lubrication. J. E. Brophy and W. A. Zisman. *Annals of the New York Academy of Sciences,* v. 53, art. 4, June 27, 1951, p. 836-861.

Structure and mechanical properties of monolayers of amphipathic molecules adsorbed on metals; and surface chemical reactions of polar compounds with common metals. Data for specific compounds adsorbed on different metals and metal powders. Rust-inhibitive properties. Wear curves for steel on steel using different lubricants and four-ball tester. (P13, R10, Q9, ST)

35-P. The Electrical Resistivity of Gallium and Some Other Anisotropic Properties of This Metal. R. W. Powell. *Proceedings of the Royal Society,* ser. A, v. 209, Nov. 22, 1951, p. 525-541.

Single crystals of gallium can be produced with considerable ease. These crystals show greater anisotropy in their conducting properties than those of other metals. It is believed that thermal conductivity varies as much as does electrical conductivity and that mechanical properties will also prove to be markedly anisotropic. 20 ref. (P15, P12, Q general, Ga)

36-P. Electrical Resistivity of Gallium Single Crystals at Low Temperatures. Marianne Olsen-Bär and R. W. Powell. *Proceedings of the Royal Society,* ser. A, v. 209, Nov. 22, 1951, p. 542-550.

A detailed investigation was made over the range 20.4-4.2°K. The anisotropy of this property increases in this region where the resistivity ratios for the three specimens are approximately 1:2.1:8 compared with 1:2.1:6.5 at room temperature. (P15, Ga)

37-P. Variation of Resistivity of Thin Metallic Films as a Function of Thickness and of Temperature. (In French). J. P. Borel. *Helvetica Physica Acta,* v. 24, Sept. 20, 1951, p. 389-400.

Results of study on thin films of silver. (P15, Ag)

38-P. Mechanism of Magnetic Breaks. (Preliminary Report). (In German.) Th. Hofbauer and K. M. Koch. *Zeitschrift für Physik,* v. 130, Oct. 9, 1951, p. 409-414.

Experiments show that an auxiliary field of higher frequency promotes formation and course of magnetic breaks and thus increases saturation magnetization and remanence. Results of experiments on Ni wire and on Fe-Ni sheet are described and shown by means of oscillograms. (P16, Fe, Ni)

39-P. Investigation of "Thick" Metal Layers and Their Surface Layers With the Aid of the "Absolute Phase". (In German.) Herwig Schopper. *Zeitschrift für Physik,* v. 130, Oct. 9, 1951, p. 427-444.

Possible new methods and a process for determining the index of the layers. Refractive index of silver and thickness of transition layers (on exposed side of metal layer) were also investigated. 16 ref. (P17)

40-P. Measuring Vapor Pressures and Coefficients of Condensation of Iron, Cadmium, and Silver. (In Ger-

man.) Günter Wessel. *Zeitschrift für Physik*, v. 130, Oct. 9, 1951, p. 539-548.
Procedures. Diagrams, tabulated and graphed data. 20 ref.
(P12, Fe, Cd, Ag)

41-P. The Solubility of Gold. Konrad B. Krauskopf. *Economic Geology and the Bulletin of the Society of Economic Geologists*, v. 46, Dec. 1951, p. 858-870.
The solubilities of Au in various solutions calculated from thermodynamic data agree reasonably well with experimental results. Data are tabulated. 16 ref. (P13, Au)

42-P. The Heat of Combustion of Magnesium and Aluminum. Charles E. Holley, Jr. and Elmer J. Huber, Jr. *Journal of the American Chemical Society*, v. 73, Dec. 1951, p. 5577-5579.
Previously abstracted from U. S. A.E.C. AECU-1172. See item 152-P, 1951. (P12, Al, Mg)

43-P. Thermal Properties of the Alkali Metals. I. The Heats of Reaction of Sodium and Potassium With Water at 25°. II. The Heats of Formation of Some Sodium-Potassium Alloys at 25°. Eugene E. Ketchen and W. E. Wallace. *Journal of the American Chemical Society*, v. 73, Dec. 1951, p. 5810-5814.
28 references. (P12, Na, K, P)

44-P. Nomogram for Comparing the Weights of Magnesium, Aluminum and Steel. *Materials & Methods*, v. 34, Dec. 1951, p. 105.
A simple means for calculating and comparing weights, also for general multiplication and division. (P10, Mg, Al, ST)

45-P. The Influence of Deviations From the Debye Spectrum on the Electrical Conductivity of Metals. F. H. J. Cornish and D. K. C. MacDonald. *Philosophical Magazine*, ser. 7, v. 42, Dec. 1951, p. 1406-1410.
A survey. Data are tabulated and graphed. 14 ref. (P15)

46-P. On the Calculation of Characteristic Temperatures From the Elastic Constants. M. Blackman. *Philosophical Magazine*, ser. 7, v. 42, Dec. 1951, p. 1441-1442.
Presents a formula for calculating Θ_o values from elastic constants. Cases of alloys which are elastically anisotropic. Data are tabulated for Ag, Au, and representative Ag-Au alloys. (P12, Q21, Ag, Au)

47-P. Resonance-Region Neutron Spectrometer Measurements on Silver and Tungsten. W. Selove. *Physical Review*, ser. 2, v. 84, Dec. 1, 1951, p. 869-876.
The first use of the resonance region time-of-flight spectrometer for measurements of neutron-transmission properties. One of the principal advantages of this instrument is that comparatively small samples are required, and measurements can be made on many comparatively rare materials. (P10, Ag, W)

48-P. Total Neutron Cross Sections of Cobalt, Manganese, and Molybdenum. Warren Fenton Subbins. *Physical Review*, ser. 2, v. 84, Dec. 1, 1951, p. 902-905.
Experimental procedure and results of measurement. Graphs.
(P10, Co, Mn, Mo)

49-P. The Stopping Power of Metals and Semiconductors. Z. H. Heller and D. J. Tendam. *Physical Review*, ser. 2, v. 84, Dec. 1, 1951, p. 905-909.
A study of the dependence of nuclear-radiation stopping power on velocity and atomic number. An empirical formula derived from tnese data expresses the electronic stopping power relative to Al as a function of energy and atomic number over a wide range. (P10)

50-P. Neutron Scattering and Polarization by Ferromagnetic Materials. C. G. Shull, E. O. Wollan, and W. C. Koehler. *Physical Review*, ser. 2, v. 84, Dec. 1, 1951, p. 912-921.
Studies of intensity distribution and polarization of the scattered neutron radiation from both unmagnetized and magnetized ferromagnetic substances. The form factor dependence of magnetic scattering, the basic nature of the neutron's magnetic interaction, and the magnetic structure existing in certain ferromagnetics. (P16)

51-P. Magnetostrictive Vibration of Prolate Spheroids. Analysis and Experimental Results. F. J. Beck, J. S. Kouvelities, and L. W. McKeehan. *Physical Review*, ser. 2, v. 84, Dec. 1, 1951, p. 957-963.
Through an analysis of this vibrational system, a method is developed whereby values may be computed for the incremental permeability, magnetostriction constant, modulus of elasticity, and dissipation constant of the ferromagnetics. Annealed specimens of nickel and of several Ni-Fe alloys, as well as of Ni in the unannealed state, were tested. (P16, Ni, Fe)

52-P. Thermal Conductivities of Pure Metals at Low Temperatures. I. Aluminum. F. A. Andrews, R. T. Webber, and D. A. Spohr. *Physical Review*, ser. 2, v. 84, Dec. 1, 1951, p. 994-996.
Thermal conductivities of three specimens of pure Al were measured in the range 2-20° K. All specimens showed maximum conductivities between 14 and 17° K. Measured values are compared with the theory of Sondheimer. 22 ref. (P11, Al)

53-P. Sintered Copper With Extremely High Conductivity. F. Pawlek. *Powder Metallurgy Bulletin,* v. 6, Dec. 1951, p. 83.

Experiments run to confirm results of investigators on the effect of O_2 and H_2 on the electrical conductivity of Cu.
(P15, H general, Cu)

54-P. Some Special Characteristics of Soft Magnetic Materials Used in Instrument Manufacture. G. A. V. Sowter. *Proceedings of the Institution of Electrical Engineers,* v. 98, pt. 2, Dec. 1951, p. 714-727, disc., p. 753-759.

Merits of a number of high-permeability magnetic alloys under a variety of conditions likely to be met in instrument practice. The properties found with d.c., a.c. and combined a.c.-d.c. operation. Recommendations for the best alloy to be employed in particular circumstances. Information on the spread of the magnetic characteristics of Mumetal spiral cores on a commercial scale. (P16, T8, Ni, SG-p)

55-P. Contact Resistance—the Contribution of Nonuniform Current Flow. W. B. Kouwenhoven and W. T. Sackett, Jr. *Transactions of the American Institute of Electrical Engineers,* v. 70, pt. 1, 1951, p. 791-795.

Results of the study provide an explanation of spreading resistance. Curves are presented for calculating its magnitude for single and multiple constricting contacts. (P15)

56-P. On the Magnetic Hysteresis Losses in Magnetostriction Vibration. Yoshimitsu Kikuchi and Hiroshi Shimizu. *Science Reports of the Research Institutes, Tohoku University,* ser. B, v. 1-2, Mar. 1951, p. 365-379.

Theoretical analysis followed by results of experiments on symmetrical and unsymmetrical magnetic hysteresis losses of Ni under various tensions. Graphs and diagrams. (P16, Ni)

57-P. Method of Measuring the Electrical Conductivity of Metallic Crystals and Melts. (In German.) Adolf Knappwost. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie,* v. 55, Oct. 1951, p. 598-600.

In the method described, electrical conductivity of metal may be determined in the range from the melting point to room temperature. The specimen is located in the magnetic field of force of a coil carrying an alternating current. Includes circuit diagram, graphs, and references. (P15)

58-P. Flow Method for Determining the Adsorption Times of Gas Molecules on Metal Surfaces. (In German.) Werner Brandt. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie,* v. 55, Oct. 1951, p. 652-654.

Experiments to measure the adsorption time of a series of gases on Pt-Cu alloy wires. (P13, Pt, Cu)

59-P. The Change of Wettability of Platinum by the Action of Different Gases. (In Russian.) I. N. Plaksin and S. I. Vladimirov. *Doklady Akademii Nauk SSSR,* new ser., v. 78, June 11, 1951, p. 933-935.

Results of a study of the influence of oxygen, air, argon, nitrogen and CO_2 on the surface in relation to the flotation properties of minerals. Data are charted. (P10, B14, Pt)

60-P. Formulas for Calculation of the Surface Tension of Metals. (In Russian.) L. L. Kunin. *Doklady Akademii Nauk SSSR,* new ser., v. 79, July 1, 1951, p. 93-96.

Surface tensions were calculated using equations proposed by various authors and compared with experimental values for Fe and a wide variety of nonferrous metals. Data are tabulated. 16 ref. (P10)

61-P. Thermodynamic Functions of Al_4C_3, Si, SiO_2, SiC, AlF_3, and $Na_3Al\ F_6$. (In Russian.) L. I. Ivanova. *Zhurnal Obshchei Khimii,* v. 21(83), Mar. 1951, p. 444-452.

Calculated theoretically, tabulated, graphed, and discussed. 24 ref. (P12, Si, C-n)

62-P. Transformer Sheet; Variation in Electrical Properties. S. Rushton and D. R. G. Davies. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 583-589; disc., p. 637-639.

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 145-P, 1951. (P15, Fe)

63-P. Cast Irons; Growth Characteristics. W. C. Heselwood and F. B. Pickering. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 596-600; disc., p. 639-644.

Previously abstracted from the *Journal of the Iron and Steel Institute.* See item 258-P. 1951 (P10, CI)

64-P. Thermal Conductivity of Liquid Sodium and Potassium. C. T. Ewing, J. A. Grand, and R. R. Miller. *Journal of the American Chemical Society,* v. 74, Jan. 5, 1952, p. 11-14.

Conductivity coefficients were measured for liquid Na and K with a longitudinal heat flow apparatus —sodium to 510 and potassium to 610° C. An apparatus for accurate measurement of high-boiling metals to 600° C. The ideality of the pure-liquid-metal media is shown by the conformation of the conductivity values to empirical and theoretical postulations. 12 ref. (P11, Na, K)

65-P Magnesium-Cadmium Alloys. II. The Use of the Electrochemical

Cell to Determine the Heats, Free Energies and Entropies of Formation of the Solid Alloys in the Temperature Range Above the Order-Disorder Curie Points. Forrest A. Trumbore, W. E. Wallace, and R. S. Craig. **III. Some Calorimetrically Determined Heats of Formation at 25°.** Thomas M. Buck, Jr., W. E. Wallace, and Richard M. Rulon. *Journal of the American Chemical Society,* v. 74, Jan. 5, 1952, p. 132-139.

35 references. (P12, Mg, Cd)

66-P. The Vapor Pressures of Tellurium and Selenium. L. S. Brooks. *Journal of the American Chemical Society,* v. 74, Jan. 5, 1952, p. 227-228.

Measured with quartz Bourdon gages, at pressures up to about ⅛ atm. for Te and just over 1 atm. for Se. 17 ref. (P12, Te, Se)

67-P. "Corbino Effect" and Magnetic Resistance Change in Bismuth. (In German.) L. Halpern and K. M. Koch. *Acta Physica Austriaca,* v. 5, Nov. 1951, p. 129-133.

Corbino's modified method of determining Hall constant, and its application to Bi disks at about 90° K. A field of only 700 oersteds effected a 51.8% increase in resistance of the full disk, while the resistance increase dropped to 38% when the disc was slit from circumference to center. Includes diagrams. (P16, Bi)

68-P. The Effect of Trace Elements in Pure Copper. (In German.) H. J. Wallbaum. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 4, Oct. 1951, p. 377-383.

Results of experiments with electrolytic Cu wire show that various trace elements greatly affect the electrical properties and crystal structure of copper. Includes graphs, tables, and X-ray diagrams. (P15, M26, Cu)

69-P. Study of Thin Absorbent Layers With the Aid of the Absolute Phase. (In German.) Herwig Schopper. *Zeitschrift für Physik,* v. 130, Nov. 13, 1951, p. 565-584.

Old and new methods of determining optical constants and layer thickness. The assumption that spatially dispersed globules form the layers will not explain the behavior of thin metal layers, but experimental and theoretical results agree when it is assumed that the layers are composed of spheroids and that their axial ratios are statistically distributed about a probable value. Includes graphs and tables. 20 ref. (P17)

70-P. Magnetic Susceptibility of Gray Tin. (In German.) G. Busch and E. Mooser. *Zeitschrift für physikalische Chemie,* v. 198, Nos. 1-4, Oct. 1951, p. 23-29.

Magnetic susceptibility is composed of three parts, namely: the thermally independent diamagnetism of Sn atoms, the thermally dependent diamagnetism of free charge carriers, and the paramagnetism of Mg ions (if present) acting as acceptors. Includes graphs. (P16, Sn)

71-P. Effect of Impurities on the Initial Permeability of Materials. (In German.) Martin Kersten. *Zeitschrift für physikalische Chemie,* v. 198, Nos. 1-4, Oct. 1951, p. 89-106.

Explains theoretically the fact that slight impurities reduce initial permeability of commercially pure Fe more than initial permeability of reversible Ni-Fe alloys containing 40-100% Ni. Charts and diagrams. 19 ref. (P16, Ni, Fe)

72-P. (Book) **Karl A. Hofmann: Anorganische Chemie (Karl A. Hofmann's Inorganic Chemistry.)** Ed. 14. Ulrich Hofmann and Walter Rüdorff. 864 pages. 1951. Friedr. Vieweg & Sohn, Braunschweig, Germany.

A handbook for the experienced chemist as well as a textbook for the student. Properties, occurrence, preparation, and use of elements in organic compounds. Includes diagrams, tables, and the spectra of several elements. (P13)

73-P. Experimental Research on the "Wetting Effect" and "Liquostriction". C. Benedicks and R. Harden. (Translated and condensed.) *Engineers' Digest,* v. 12, Dec. 1951, p. 408-412.

Previously abstracted from *Metallurgia Italiana.* See item 376-P, 1951. (P10, Q23)

74-P. Heats of Formation of Sodium-Tin Alloys Determined With a New High Temperature Calorimeter. Raleigh L. McKisson and LeRoy A. Bromley. *Journal of Metals,* v. 4, Jan. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 33-38.

A high-temperature calorimeter was designed for use up to 1500° K. Theory of its operation. This calorimeter was used to measure the heats of formation of Na-Sn alloys ranging in composition from Sn to Na_2Sn. The values tend to support those reported by Kubaschewski and Seith. Graphs and tabulated data. 15 ref. (P12, Sn, Na)

75-P. Volatility and Stability of Metallic Sulphides. C. M. Hsiao and A. W. Schlechten. *Journal of Metals,* v. 4, Jan. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952; p. 65-69.

The apparent vapor pressures of a number of metal sulfides were determined by measuring their rate of weight loss when they were heated

under vacuum. Information should be useful in determining the practicality of selective volatilization of the sulfides as well as an aid in planning direct reduction processes for sulfide ores. Graphed and tabulated data. 18 ref. (P12, C21)

76-P. Engineering Aspects of Liquid Metals for Heat Transfer. Thomas Trocki. *Nucleonics,* v. 10, Jan. 1952, p. 28-32.

Work accomplished with developmental systems indicates that liquid metals hold considerable promise as reactor coolants and heat-transfer fluids for systems operating above 600° F. Comparative physical properties of Na, NaK, "Heat-transfer salt", Dowtherm A, Hg, Pb, Pb-Bi eutectic, Li, and H_2O are tabulated. Handling and safety problems, system design and construction, liquid-metal heat exchangers, advantages of liquid metals in pumping and instrumentation, and purification of liquid metals. (P11, T25)

77-P. Properties of Solids. Melvin A. Cook. *Utah Engineering Experiment Station* (Salt Lake City), Bulletin 53, Sept. 1951, 68 pages.

Empirical correlation of band properties of solids, thermal expansion and chemical bonding in homonuclear solids, compressibility of homonuclear solids, conductivity of metals, and an interpretation of nonclassical energy relations in chemical bonds. (P general)

78-P. Optical Properties of Tellurium in the Infra-Red. T. S. Moss. *Proceedings of the Physical Society,* v. 65, sec. B, Jan. 1, 1952, p. 62-66.

The refractive index and absorption constant of Te layers were measured in the near infrared. The refractive index was measured over the wavelength range 3-11 μ. The value extrapolated to long wavelengths was found to be 4:8; this is much higher than any other known refractive index. (P17, Te)

79-P. The Work Functions of Copper, Silver, and Aluminium. E. W. J. Mitchell and J. W. Mitchell. *Proceedings of the Royal Society,* Ser. A, v. 210, Dec. 7, 1951, p. 70-84.

Changes in the work functions of metallic surfaces which result from adsorption of O_2 and formation of oxide films on the surfaces. Cu, Ag, and Al were used for these experiments, because they show three distinct types of behavior when they react with O_2. 22 ref.
(P15, R2, Ag, Cu, Al)

80-P. The Reduction Equilibria of Zinc Oxide and Zinc Silicate With Hydrogen. J. A. Kitchener and S. Ignatowicz. *Transactions of the Faraday Society,* v. 47, Dec. 1951, p. 1278-1286.

An improved method for studying equilibria between solids and gases at high temperature was developed. Measurements were made in the range 750-1000° C. The results lead to values of free energy, heat, and entropy of formation of ZnO and Zn_2SiO_4 which are in good agreement with values calculated from other thermochemical data. 11 ref. (P12, Zn)

81-P. The Adsorption on Metal Surfaces of Long Chain Polar Compounds From Hydrocarbon Solutions. S. G. Daniel. *Transactions of the Faraday Society,* v. 47, Dec. 1951, p. 1345-1359.

In studies on Cu, Pb, Zn, and Cd, the isotherms could not be determined because of reactions between the acid and oxide films on the metal surface. In general, ease of adsorption increases with increasing chain length and, for a given chain length, the acid is most strongly adsorbed and the ester least, with the alcohol intermediate. Influence upon adsorption of other factors such as temperature and solubility. In some cases it was possible to calculate free energy and heat of adsorption. Data are graphed. 17 ref. (P13)

82-P. Interception of Heat Rays With the Aid of Metallic Sheets. (In French.) Victor Broida. *Chaleur et Industrie,* v. 32, Dec. 1951, p. 347-352.

Results of a study on the protection of persons and objects against rays from incandescent sources by means of metallic sheets. A mathematical system explaining the theory of this technique. Includes graphs and tables for sheets of brass, bronze, copper, and steel.
(P11, A7, Cu, ST)

83-P. Theory of Holes in Liquids. Calculation of the Variation of Volume During Melting. (In French.) Genevieve Sutra. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 233, Nov. 12, 1951, p. 1186-1187.

A method of calculating the variation of volume during melting comparing this variation with the total volume of the holes. Data for volumetric and energy factors of Ag, Al, Zn, Na, Ga, Hg, Ne, and A are tabulated.
(P10, Ag, Al, Zn, Ga, Hg)

84-P. Resistance Anomalies of a Highly Permeable Nickel-Iron-Molybdenum Alloy. (In German.) Fritz Assmus and Friedrich Pfeifer. *Zeitschrift für Metallkunde,* v. 42, Oct. 1951, p. 294-299.

Experiments on an alloy containing 79% Ni, 5% Mo, remainder Fe. Results of various heat treatments. 16 ref. (P15, P16, Ni)

85-P. The Ferromagnetic Faraday Effect at Microwave Frequencies and Its Applications. The Microwave Gyrator. C. L. Hogan. *Bell System Technical Journal,* v. 31, Jan. 1952, p. 1-31.

A new microwave circuit element dependent on the Faraday rotation of a polarized wave was developed. Polder's analysis was extended to include a wave being propagated through a ferromagnetic substance with dielectric and magnetic loss; results give experimental verification of the theory. Experimental technique may also be of some interest in studying the properties of ferrites at microwave frequencies. 12 ref. (P16)

86-P. Development of Thermocouples for Use on Thermoelectric Generators. *Franklin Institute, Quarterly Progress Report* P-2205-4, 1951, 10 pages.

Summarizes work on a program of theoretical and experimental research conducted for the purpose of improving understanding of the thermo-electric properties of materials and of developing a thermocouple of improved efficiency for use in thermo-electric generators. Concerned principally with the development of processes for quantity production of Zn-Sb thermocouple elements and suitable means for soldering or fusing these elements to constantan. Preparation and thermo-electric properties of PbS were investigated. Attention was given to problems involved in transfer of heat from the source to the hot junctions.
(P15, Zn, Sb, Cu, Ni)

87-P. Contact Potential Variations on Freshly Condensed Metal Films at Low Pressures. Leland L. Antes and Norman Hackerman. *Journal of Applied Physics,* v. 22, Dec. 1951, p. 1395-1398.

The reason for contact differences of potential. Results indicate characteristically different behavior for each of the six metals studied. Electrical resistance measurements made on similar metal films under similar conditions are correlated with contact potential measurements. Studies were made on Al, Cu, Au, Ni, Fe and Cr.
(P15, Al, Cu, Au, Ni, Fe, Cr)

88-P. Volta Potentials of the Copper-Nickel Alloys and Several Metals in Air. Herbert H. Uhlig. *Journal of Applied Physics,* v. 22, Dec. 1951, p. 1399-1403.

Volta potentials can reliably and consistently differentiate between many metals of the periodic table. Also, effects of electronic interaction between Ni and Cu in alloys of these metals can be detected and reproduced. The Volta potential, as usually measured, is an average of surface phases weighted in accord with the area of each phase exposed.
(P15, Ni, Cu)

89-P. Dimensional Changes Normal to the Diffusion Direction. R. W. Balluffi and B. H. Alexander. *Journal of Metals,* v. 4, Feb. 1952, p. 146.

Experiments on diffusion of Ag into Au showed that normal expansion is not caused by grain-boundary diffusion. Normal percentage expansion was found to be over half of the parallel percentage expansion in polycrystalline wires.
(P10, N1, Ag, Au)

90-P. Low Melting Gallium Alloys. R. M. Evans and R. I. Jaffee. *Journal of Metals,* v. 4, Feb. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 153-156.

Investigation of properties. Includes effects of binary additions on the melting point of Ga, and its corrosive action on other metals and alloys. Phase diagrams. Data are tabulated for Ga-Sn-Zn and Ga-Sn-Zn-Al alloys. (P12, M24, R6, Ga)

91-P. Silicon-Oxygen Equilibrium in Liquid Iron. Nevzat A. Gokcen and John Chipman. *Journal of Metals,* v. 4, Feb. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 171-181.

Molten Fe-Si-O alloys in silica crucibles were brought into equilibrium with atmospheres of controlled H_2O/H_2 ratio, quenched in hydrogen, and analyzed. Rates of oxidation and reduction were studied in experiments lasting up to 16 hr. at 1600° C. The rate-determining part of the process is the transfer of oxygen from gas to metal or the reverse which, under the experimental conditions, was about 20% efficient. 21 ref. (P12, D general, Fe, ST)

92-P. Effect of Cold Work and Annealing on the Thermoelectric Power of Molybdenum. J. Howard Kittel. *Journal of Metals,* v. 4, Feb. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 196.

Data on the investigation are graphed. (P15, J23, Mo)

93-P. A Two Fluxmeter Method of Measuring Ferromagnetic Hysteresis Loss. H. Aspden. *Journal of Scientific Instruments,* v. 29, Jan. 1952, p. 5-7.

A method for measuring hysteresis loss without recourse to complicated devices and special instruments. It is as accurate as any other method and is simple to operate. (P16)

94-P. Heat Treatment in Magnetic Field. *Metal Progress,* v. 61, Jan. 1952, p. 106-107. (Condensed from "Iron-Sili-

con Alloys Heat Treated in a Magnetic Field," Matilda Goertz.)

Previously abstracted from *Journal of Applied Physics.* See item 241-P, 1951. (P16, J23, Fe, SG-n, p)

95-P. On θ Values in the Resistance of Metals. P. G. Klemens. *Proceedings of the Physical Society,* v. 65, sec. A, Jan. 1952, p. 71-72.

Relation to temperature. (P15)

96-P. A Ferromagnetic Hysteresis Potentiometer. Harold Aspden. *Review of Scientific Instruments,* v. 22, Dec. 1951, p. 869-871.

Construction principles and method of operation. (P16)

97-P. Magnetization Hysteresis Loop Tracer for Long Specimens of Extremely Small Cross Section. E. C. Crittenden, Jr., A. A. Hudimac, and R. I. Strough. *Review of Scientific Instruments,* v. 22, Dec. 1951, p. 872-877.

An instrument for measurement of the low-frequency magnetic properties of thin layers. (P16)

98-P. On the Abnormality in the Thermal Expansion of Iron-Platinum Alloys. (In English.) Hakaru Masumoto and Takeo Kobayashi. *Science Reports of the Research Institutes, Tohoku University,* sec. A, v. 2, Dec. 1950, p. 856-860.

Measurements on the thermal expansion of binary alloys of Fe and Pt were carried out, and it was found that the alloys containing 52.5-53.5% Pt have, at near room temperature, negative coefficients of expansion. (P11, Fe, Pt)

99-P. The Densities of Nickel-Cobalt Alloys. (In English.) Mikio Yamamoto. *Science Reports of the Research Institutes, Tohoku University,* sec. A, v. 2, Dec. 1950, p. 871-877.

The density vs. composition relationships for the γ-phase and ε-phase alloys are expressed by equations. Data are tabulated and graphed. 11 ref. (P10, AY)

100-P. On the Mechanism of Magnetic After-Effect of a Ferromagnetic Substance. (In English.) Seiziro Maeda. *Science Reports of the Research Institutes, Tohoku University,* sec. A, v. 2, Dec. 1950, p. 878-889.

A theory for the magnetic after-effect was proposed, taking into account the irreversible displacement of the domain boundaries in a ferromagnetic substance. According to the theory, the characteristic nature of the after-effect does not change within wide ranges of magnetic field, tension applied, and temperature. A simple formula for approach to equilibrium in magnetization was given on the basis of the theory. (P16)

101-P. Absorption of Nitrogen by Molten Iron Alloys. III. Study on Fe-C and Fe-Si Alloys. (In English.) Tunezo Saito. *Science Reports of the Research Institutes, Tohoku University,* sec. A, v. 2, Dec. 1950, p. 909-916.

The absorption phenomena of nitrogen by molten Fe-C and Fe-Si alloys was studied. (P12, Fe, ST)

102-P. Conductivity and Some Other Electric Properties of Thoria in a Vacuum. (In French.) G. Mesnard and R. Uzan. *Vide,* v. 6, July-Sept. 1951, p. 1052-1062; Nov. 1951, p. 1091-1097.

Experimental tubes used in measuring electrical conductivity of thoria; processes used for measuring resistance, thermo-electric emf., and thermal conductivity; and results obtained. Part II: Thermo-electric and commutation effect, and activation by the passage of current. Charted data and diagrams. 21 ref. (P15)

103-P. Thermomagnetic Analysis. (In German.) H. Merkel. *Chemie-Ingenieur-Technik,* v. 23, Dec. 21, 1951, p. 570-575.

The principles of ferromagnetism and of magnetic scales. Directions for performing the measurements; alloys and catalysts, especially for Fischer-Tropsch synthesis, are cited as examples of application of thermomagnetic analysis. Diagrams, graphs, and tables. 15 ref. (P16, SG-n,p)

104-P. A Ferromagnetic Phase in the Nickel-Manganese-Antimony System. (In German.) L. Castelliz. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften,* v. 82, Dec. 15, 1951, p. 1059-1085.

A number of Ni-Mn-Sb alloys were radiographically investigated, and their saturation magnetization and Curie temperatures measured. Magnetic momenta of the atoms were computed. Tables, graphs, and X-ray diagrams. 14 ref. (P16, Ni, Mn, Sb)

105-P. The Temperature Dependence of Magnetic Strength of Ferromagnetic Metals. (In Russian.) E. F. Kuritsyna. *Doklady Akademii Nauk SSSR,* new ser., v. 79, July 11, 1951, p. 233-236.

Magnetic strengths were determined experimentally from 86 to 1013° K. for Fe and from 86 to 1073° K. for Co. Results are charted. (P16, Fe, Co)

106-P. Seignette-Electric (Ferroelectric) Theory. (In Russian.) G. A. Smolenskii and R. E. Pasynkov. *Doklady Akademii Nauk SSSR,* new ser., v. 79, July 21, 1951, p. 431-434.

A theoretical analysis is made of the ferro-electric effect at the Curie point. Results are compared with experimental data. (P15)

107-P. Resistivity of Single-Phase Monovalent Metals. (In Russian.) N. V. Grum-Grzhimailo. *Doklady Akademii Nauk SSSR,* new ser., v. 79, July 21, 1951, p. 461-462.

The electrical resistivity of Au-Ag and Ca-Rb alloys was investigated. Results are charted. (P15, Au, Ag, Ca, Rb)

108-P. Energy of Dissociation of Copper Arsenide. (In Russian.) M. E. Kochnev. *Doklady Akademii Nauk SSSR,* new ser., v. 79, July 21, 1951, p. 463-465.

The energy of dissociation of Cu-As alloys in relation to temperature was studied and compared with the equilibrium diagram of the system. Data are tabulated and charted. (P12, M24, Cu, As)

109-P. Thermodynamics of the Iron-Carbon System. (In Spanish.) Francisco Munoz del Corral. *Instituto del Hierro y del Acero,* v. 4, Jan.-Mar. 1951, p. 52-61; Apr.-June 1951, p. 131-136.

On the basis of existing methods of determining the activity of C in different forms of steel, and using extrapolation methods, a coherent thermodynamic interpretation of the Fe-C system was developed. Information is presented on the free energy of formation of cementite from the different allotropic forms of iron. Influence of Si and Mn on carbon activity was investigated. Data are tabulated. 38 ref. (P12, N8, Fe, ST)

110-P. Optical Properties of Surface Films. Alexandre Rothen. *Annals of the New York Academy of Sciences,* v. 53, July 20, 1951, p. 1054-1063.

Optical phenomena occurring on reflection of light from a metallic surface coated with a film, and especially their application to determination of thickness of the film. (P17)

111-P. Measurement of Properties of Thin Films on Chromium by the Reflection of Polarized Light. J. B. Bateman and Margaret W. Harris. *Annals of the New York Academy of Sciences,* v. 53, July 20, 1951, p. 1064-1081.

Results of polarization measurements on aliphatic-acid layers transferred to chromium by the Blodgett method. The data were obtained in order to determine the conditions most favorable to the precise simultaneous measurement of thickness and refractive index. 17 ref. (P17, Cr)

112-P. Laboratory Measurement of Iron Losses at Audio Frequencies. C. C. Horstman and A. Lucic. *ASTM Bulletin,* Jan. 1952, p. 64-66.

An instrument for laboratory testing of core material for iron-core inductor components at frequencies higher than 60 cycles. The equipment and the operational details of the instrument and special requirements for obtaining accuracy and reliability in these higher frequency measurements. (P15, Fe, SG-p)

113-P. An Interferometric Method for the Determination of the Absorption Coefficients of Metals, With Results for Silver and Aluminum. L. G. Schulz. *Journal of the Optical Society of America,* v. 41, Dec. 1951, p. 1047-1051.

The method utilizes the change in phase accompanying the reflection of light at normal incidence. The reflecting layers in an interference filter are made of the metal being studied. From the optical thickness of the dielectric between the reflecting layers and the wave length of the light transmitted, the phase change can be calculated. 13 ref. (P17, Ag, Al)

114-P. A Note on the Adiabatic Thermomagnetic Effects. Herbert B. Callen. *Physical Review,* ser. 2, v. 85, Jan. 1, 1952, p. 16-19.

The thermodynamic theory of transverse adiabatic thermomagnetic effects is extended, and the final complete set of thermodynamic relations among all thermomagnetic effects is summarized. (P12)

115-P. The Magnetic Susceptibility of Uranium. C. J. Kriessman, Jr., and T. R. McGuire. *Physical Review,* ser. 2, v. 85, Jan. 1, 1952, p. 71-72.

Using a body-force method, magnetic susceptibility was measured as a function of temperature. Results are charted and compared with those of other investigators. 12 ref. (P16)

116-P. Superconductivity of Vanadium. Aaron Wexler and William S. Corak. *Physical Review,* ser. 2, v. 85, Jan. 1, 1952, p. 85-90.

The magnetic properties exhibited by most specimens of the so-called hard superconductors are due to internal strain arising from either mechanical work or interstitially located impurities such as C, N_2, and O_2. The very large effects of small concentrations of these impurities on the superconductive properties can be understood on this basis. 30 ref. (P15, P16, V)

117-P. Magnetic Properties of a Hollow Superconducting Lead Sphere. Julius Babiskin. *Physical Review,* ser. 2, v. 85, Jan. 1, 1952, p. 104-106.

Studied by measuring the magnetic field distributions along the equatorial plane with bismuth probes. After cooling in the absence of a magnetic field, the hollow

sphere was found to be a perfect magnetic shield in the superconducting state. (P16, Pb)

118-P. A Cryoscopic Study of the Solubility of Uranium in Liquid Sodium at 97.8° C. Thomas B. Douglas. *U. S. Atomic Energy Commission,* AECD-3254, Mar. 12, 1951, 8 pages.

With an average reproducibility of approximately ±0.001° C., measurements were made of equilibrium temperatures at various stages of melting from 70 to 100% complete, of three samples of Na. One sample contained U in bulk form and one sample contained finely divided U. (P13, U)

119-P. (Book) **Textbook of Electrochemistry. Vol. I and II.** G. Kortüm and J. O'M. Bockris. 882 pages. 1951. Elsevier Publishing Co., 445 Park Ave., New York.

Emphasis is on a clear understanding of fundamental principles. Important recent advances in the field are covered. Footnote references. (P15)

120-P. The Influence of the Core Material on the Thermionic Emission of Oxide Cathodes. H. A. Poehler. *Proceedings of the I.R.E.,* v. 40, Feb. 1952, p. 190-196.

Alloys of Ni with 4.8% Mn, 4.0% Al, 0.38% Mg, and 3.5% W were used as cores, with pure electrolytic Ni as a core being used as a control. The experiments showed that both the d.c. and pulsed emission of oxide cathodes are dependent on the core to a marked degree. (P15, Ni)

121-P. The Electric Conductance of Liquid Iron Oxide. J. W. Tomlinson and H. Inouye. *Journal of Chemical Physics,* v. 20, Jan. 1952, p. 193.

Results of experiments on the above in equilibrium with solid Fe. Results were typical of a semiconductor of the type exemplified by solid, nonstoichiometric oxides of the transition metals. (P15, Fe)

122-P. Copper Alloys in the Watch Industry. Watch Frames. Philippe De Coulon. **Watch Escapements.** Simon-Vermot. **Nickel-Silver Watch Cases.** *Metal Industry,* v. 80, Feb. 15, 1952, p. 127-130.

Includes tabular data on Cu and Ni-Ag alloys covering description, composition, density, expansion, and electrical resistance. Microstructure and mechanical properties. (T9, Cu, Ni, Ag)

123-P. Interaction Between the d-Shells in the Transition Metals. IV. The Intrinsic Antiferromagnetic Character of Iron. C. Zener. *Physical Review,* ser. 2, v. 85, Jan. 15, 1952, p. 324-328.

The principles developed in previous papers of this series are applied to interpret the presence of ferromagnetism in beta-centered cubic iron, its absence in face-centered cubic iron. It is found necessary to introduce a new principle, namely that, for minimum energy, the d-shell electrons are distributed among the atoms so as to maximize the total number of pairs of electrons having like spin within the individual atoms. 28 ref. (P16, Fe)

124-P. Theory of Conductivity of Semiconductors. George Jaffé. *Physical Review,* ser. 2, v. 85, Jan. 15, 1952, p. 354-363.

Fundamental equations and boundary conditions. The general procedure for treating the time-dependent equations. Special case of simple a.c. is treated in detail; the complete expression for the frequency dependence of the equivalent susceptance and conductance is established. The theory is compared with the results of a.c. measurements performed on locally manufactured Se disks. (P15, Se)

125-P. Neutron Diffraction Investigation of the Atomic Magnetic Moment Orientation in the Antiferromagnetic Compound CrSb. A. I. Snow. *Physical Review,* ser. 2, v. 85, Jan. 15, 1952, p. 365.

The compound has the nickel arsenide structure and shows a marked decrease in magnetic susceptibility as the temperature is lowered from the antiferromagnetic Curie point (450° C.). (P16, Cr, Sb)

126-P. The Saturation Magnetic Moment of Alloys on the Collective Electron Theory. J. E. Goldman. *Physical Review,* ser. 2, v. 85, Jan. 15, 1952, p. 375.

The perturbing effect of an alloying element on the energy bands in a metal. (P16)

127-P. The Electronic Specific Heat in Chromium and Magnesium. S. A. Friedberg, I. Estermann, and J. E. Goldman. *Physical Review,* ser. 2, v. 85, Jan. 15, 1952, p. 375-376.

Results of an experimental investigation. Data are graphed and tabulated. (P12, Cr, Mg)

128-P. The Domain Structure of a Silicon-Iron Crystal. L. F. Bates and C. D. Mee. *Proceedings of the Physical Society,* v. 65, sec. A, Feb. 1, 1952, p. 129-140.

Powder patterns were obtained for the (100) and (011) surfaces of a carefully shaped single crystal of 3% Si iron. Considerable numerical discrepancies, which are attributed to the complicated nature of the closure domains on the (011) surface, were found. 12 ref. (P16, Fe)

129-P. A Study of Surface Closure Domains by the Powder Pattern Technique. L. F. Bates and C. D. Mee. *Proceedings of the Physical Society,* v. 65, sec. A, Feb. 1, 1952, p. 140-144.

The powder patterns in the neighborhood of cavities and inclusions on the surfaces of single crystals of 3% Si iron were studied. The results are evidence for the essential correctness of current views on closure domain structures. (P16, Fe)

130-P. The Approach to Saturation Magnetostriction of Nickel. E. W. Lee. *Proceedings of the Physical Society,* v. 65, sec. B, Feb. 1, 1952, p. 162-163.

Measurements were made of the differential magnetostriction as a function of a steady applied field. Data are graphed. (P16, Ni)

131-P. The Thermal and Electrical Conductivity of Copper at Low Temperatures. R. Berman and D. K. C. MacDonald. *Proceedings of the Royal Society,* ser. A, v. 211, Feb. 7, 1952, p. 122-128.

Conductivity was measured continuously between 90 and 2° K. The specimen, which was of spectrographic purity, was found to have a pronounced minimum in its electrical resistance at about 10° K. Marked disagreement with theory was found in the temperature variation both of thermal conductivity and of Lorenz number. 11 ref. (P11, Cu)

132-P. The Viscosities of Liquid Lithium, Rubidium and Caesium. E. N. Da C. Andrade, and E. R. Dobbs. *Proceedings of the Royal Society,* ser. A, v. 211, Feb. 7, 1952, p. 12-30.

The oscillating-sphere method was applied to determination of viscosities from the melting point upward over a range of temperatures. The peculiarities of the three metals required development of special methods of handling. 16 ref. (P10, Li, Rb, Cs)

133-P. Optical Properties of Very Thin Metallic Films. (In French.) Florin Abeles. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Jan. 7, 1952, p. 198-199.

Experiments on a method of determining optical properties. Based on measurements of factors of reflection on the air side and the glass side, and on the transmission factors of thin metallic films. (P17)

134-P. The Law of Variation, as a Function of Applied Potential, of Electrical Resistance of Very Thin Metallic Deposits. (In French.) Nicolas Mostovetch, Boris Vodar, and Thérese Duhautois. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Jan. 14, 1952, p. 305-308.

Mathematical analysis plus graphical interpretation. (P15)

135-P. Thermoelectronic Emission From Ferromagnetic Materials. (In Russian.) A. V. Sokolov and A. Z. Veksler. *Doklady Akademii Nauk SSSR,* new ser., v. 81, Nov. 1, 1951, p. 27-30.

A theoretical analysis. This effect is compared with the photo effect in Ni. (P16, SG-n, p)

136-P. Causes of Changes of Magnetic Saturation of Fe-Ni-Al High-Coercive-Strength Alloys During Tempering. (In Russian.) O. S. Ivanov and Iu. M. Kazimirov. *Doklady Akademii Nauk SSSR,* new ser., v. 81, Nov. 1, 1951, p. 35-38.

Investigated in relation to ordering, various proportions of alloying elements, and electrical resistance. Data are charted. (P16, Fe, Al, Ni, SG-n, p)

137-P. The Question of Superconductivity of Cadmium. (In Russian.) B. N. Samoilov. *Doklady Akademii Nauk SSSR,* new ser., v. 81, Dec. 11, 1951, p. 791-794.

The conductivity of Cd was investigated at temperatures below 1° K. Temperature dependence of the critical field was determined. Data are charted. (P15, Cd)

138-P. Electric and Metallic Properties of Metals and Alloys. J. A. Bate. *Australasian Engineer,* Jan. 7, 1952, p. 79-89.

A review of the metallurgical aspects of electrical conductivity, thermo-electricity, and ferromagnetism. 41 ref. (P15, P16)

139-P. Contact Resistance—the Contribution of Nonuniform Current Flow. W. B. Kouwenhoven and W. T. Sackett, Jr. *Electrical Engineering,* v. 71, Mar. 1952, p. 264-268.

Previously abstracted from *Transactions of the American Institute of Electrical Engineers.* See item 55-P, 1952. (P15)

140-P. Proposed Alternative Method For Measuring Electrical Resistance of Pipe Coatings. J. K. Ballou, R. P. Howell, J. W. Liljeberg, and P. F. Offermann. *Gas Age,* 109, Feb. 28, 1952, p. 30-31, 64.

Previously abstracted from *Corrosion.* See item 13-P, 1952. (P15, L26, ST)

141-P. The Spectral Emissivity of Iron-Nickel Alloys. H. B. Wahlin, Robert Zentner, and James Martin. *Journal of Applied Physics,* v. 23, Jan. 1952, p. 107-108.

Changes with temperature indicate that, between 1200° and 1600° K., abnormal behaviors exist which

hitherto have not been suspected. A correlation of emissivity change with change in density of metals is suggested. (P17, Fe, Ni)

142-P. Bonding of Molybdenum Disulfide to Various Materials to Form a Solid Lubricating Film. I. The Bonding Mechanism. Douglas Godfrey and Edmond E. Bisson. *National Advisory Committee for Aeronautics,* Technical Note 2628, 16 pages.

An experimental investigation to determine the mechanism of bonding of MoS_2 and to extend application of the bonding of MoS_2 to a variety of materials. Adherence of dry MoS_2 powder to steel and aluminum; the physical and chemical nature of dusted, rubbed, and bonded MoS_2 films; chemical reactions in the bonding mechanism; and application of MoS_2 to a variety of metals and to glass. Qualitative tests to determine relative adherence of MoS_2 to materials were conducted. Electron diffraction was employed to detect chemical composition of solid lubricating films and presence of preferred orientation of MoS_2. Tables and graphs. (P13)

143-P. The Magnetic Susceptibility of Chromium. T. R. McGuire and C. J. Kriessman. *Physical Review,* v. 85, ser. 2, Feb. 1, 1952, p. 452-454.

Measured from −195 to 1440° C. and found to increase from 3.42 x 10^{-6} to approximately 4.30 x 10^{-6} emu. per g. at the highest temperature. A transition is recorded in the region of 1400 °C. marked by sharp increase in susceptibility and temperature hysteresis. 20 ref. (P16, Cr)

144-P. The Nuclear Magnetic Resonance of Titanium and Arsenic. C. D. Jeffries, H. Loeliger, and H. H. Staub. *Physical Review,* ser. 2, v. 85, Feb. 1, 1952, p. 478-479.

(P16, Ti, As)

145-P. The Nuclear Magnetic Moment of Tc. Harold Walchli, Ralph Livingston, and William J. Martin. *Physical Review,* v. 85, Feb. 1, 1952, p. 479.

Briefly tells how the above was determined. (P16, Tc)

146-P. Observations on the Photoelectric Work Functions and Low Speed Electron Diffraction From Thin Films of Silver on the (100) Face of a Silver Single Crystal. Edward N. Clarke and H. E. Farnsworth. *Physical Review,* ser. 2, v. 85, Feb. 1, 1952, p. 484-485.

A search was made for a possible change in structure of the deposited film which might be associated with a decrease in photo-electric work function. (P15, Ag)

147-P. Changes in Work Functions of Vacuum Distilled Gold Films. Chung Fu Ying and H. E. Farnsworth. *Physical Review,* ser. 2, v. 85, Feb. 1, 1952, p. 485-486.

Results appear to indicate that the gold film deposited on a surface at room temperature possesses some structural characteristics different from that of polycrystalline bulk gold and that the structure of the film approaches that of the bulk when the temperature of the film is raised.

(P15, M26, L25, Au)

148-P. The Atomic Heat of Lead in the Region of Its Transition to Superconductivity. J. R. Clement and E. H. Quinnell. *Physical Review,* ser. 2, v. 85, Feb. 1, 1952, p. 502-503.

Results of an investigation. (P15, Pb)

149-P. Theory of the Electrical Conductivity of Metals. I. (In German.) H. Koppe. *Zeitschrift für Naturforschung,* v. 7a, Jan. 1952, p. 17-22.

A method of treating "transport" phenomena in metals especially suitable for Fermi-effect calculations. (P15)

150-P. The Anomaly of the Electromagnetic and Thermomagnetic Transverse Effect. (In German.) H. Fieber, A. Nedoluha, and K. M. Koch. *Zeitschrift für Physik,* v. 131, No. 2, 1952, p. 143-155.

On the basis of H. Frölich's equation, coefficients of the four transverse effects are derived; The Ettinghausen and Nernst effects may be considered as secondary thermoelectric effects arising from the longitudinal limitation of the test strips. Relationships of the Hall and the Righi-Leduc effects. A table shows qualitative characteristics of Ag, Al, Cd, Co, Cu, Fe, Ni, Zn, Au, and Sb. (P16)

151-P. Emission of Electrons and Reflection of Ions From Metal Surfaces. (In Russian.) M. A. Eremeev. *Doklady Akademii Nauk SSSR,* new ser., v. 74, Aug. 11, 1951, p. 775-777.

A study was made of the above at target temperatures up to 1000° K. Sn, Ca, and Li were bombarded with Ta and W ions. Results are charted. (P15, Sn, Ca, Li)

152-P. Intermediate States of Superconductivity. (In Russian.) E. M. Lifshits and Iv. V. Sharvin. *Doklady Akademii Nauk SSSR,* new ser., v. 74, Aug. 11, 1951, p. 783-786.

Experimental data of other investigators were used to make a theoretical analysis of the intermediate states of superconductivity. (P15)

153-P. The Viscosity of Molten Metals. (In Russian.) G. M. Panchenkov.

Doklady Akademii Nauk SSSR, new ser., v. 79, Aug. 21, 1951, p. 985-988.

The viscosity of molten metals is shown to have the same temperature dependence as many common liquids, hydrocarbons, water, molten salts, etc. Calculated values are compared with experimental data for Na, K, Ag, Cd, Hg, Sn, Pb, Sb, and Bi. (P10)

154-P. Influence of Temperature on the Irreversible Electrode Potential of Aluminum. (In Russian.) V. V. Romanov and G. V. Akimov. *Doklady Akademii Nauk SSSR*, new ser., v. 79, Aug. 21, 1951, p. 989-991.

Investigation using commercial Al in 1N chloride solutions of pH's 1-13 and at 0-80° C. Data are charted. (P15, Al)

155-P. Magnetic Properties of Mercury at Low Temperatures. (In Russian.) B. I. Verkin, B. G. Lazarev, and N. S. Rudenko. *Doklady Akademii Nauk SSSR*, new ser., v. 80, Sept. 1, 1951, p. 45-46.

The magnetic properties of single crystals of Hg were studied at temperatures down to 1.465° K. Data are charted. (P16, Hg)

156-P. The Theory of Coercive Forces and Magnetic Susceptibility of Ferromagnetic Powders (Dependence on Density of Packing). (In Russian.) E. Kondorskii. *Doklady Akademii Nauk SSSR*, new ser., v. 80, Sept. 11, 1951, p. 197-200.

Theoretical, mathematical analysis, with reference to the literature. (P16, SG-n, p)

157-P. The Magnetization of Highly Coercive Ferromagnetic Substances in Weak Fields. (In Russian.) D. I. Volkov. *Doklady Akademii Nauk SSSR*, new ser., v. 80, Sept. 21, 1951, p. 349-351.

An Fe-Co-V alloy (38% Fe, 52% Co, 10% V) was used to study magnetization in fields from 25 to 345 oersteds. Data are charted. (P16, SG-n)

158-P. Optical Properties of Metallic Alloys. (In Russian.) S. V. Vonsovskii, A. A. Smirnov, and A. V. Sokolov. *Dokaldy Akademii Nauk SSSR*, new ser., v. 80, Sept. 21, 1951, p. 353-356.

The optical properties of a series of Ag-Au alloys were investigated. The data were subjected to theoretical analysis. The degree of ordering is shown to be important with regard to optical properties. (P17, Ag, Au)

159-P. The Nature of Elastic Anomalies in Alloys of the Invar and Elinvar Type. (In Russian.) K. P. Belov and O. N. Agasian. *Doklady Akademii Nauk SSSR*, new ser., v. 80, Oct. 21, 1951, p. 881-883.

The elastic and ferromagnetic properties of Fe-Ni, Fe-Pt, Fe-Ni-Co, Fe-Ni-Cr, and Fe-Co-Cr alloys were investigated. Results are charted. (P16, Q21, Fe, Ni, Pt, Co, Cr, SG-n)

160-P. The Fe-FeS-FeO System. (In Russian.) Ia. I. Ol'shanskii. *Doklady Akademii Nauk SSSR*, new ser., v. 80, Oct. 21, 1951, p. 893-896.

A study was made of equilibria in the above system. The iron corner of the Fe-S-O diagram is illustrated. Data are tabulated. (P12, M24, Fe)

161-P. Influence of Composition on the Highly Coercive State of Iron-Nickel-Aluminum Alloys. (In Russian.) O. S. Ivanov, Iu. M. Kazimirov, and O. A. Novikova. *Doklady Akademii Nauk SSSR*, new ser., v. 81, Nov. 11, 1951, p. 231-234.

In order to determine the best composition for a high-coercive-strength alloy, two series of Fe-Ni-Al alloys were studied experimentally. Data are charted. 13 ref. (P16, Fe, Ni, Al)

162-P. The Dependence of Coercive Force on the Size of Powder Particles of Soft Magnetic Materials. (In Russian.) Ia. S. Shur, T. D. Zotov, and I. A. Chebotarev. *Doklady Akademii Nauk SSSR*, new ser., v. 81, Nov. 21, 1951, p. 387-389.

The coercive strength of various sized particles of Alsifer (9.4% Si, 5.3% Al, balance Fe) was determined over the range −195 to 300° C. Results are discussed and charted. (P16, H11, Fe, SG-p)

163-P. Certain Peculiarities of the Magnetic Properties of Zinc Monocrystals at Low Temperatures. (In Russian.) B. I. Verkin. *Doklady Akademii Nauk SSSR*, new ser., v. 81, Dec. 1, 1951, p. 529-532.

The magnetic properties of single crystals of Zn were studied at 1.8-20.4° K. and in magnetic fields of 1500-15,000 oersteds. Data are charted. (P16, Zn)

164-P. Nearly Square Hysteresis Loops. (In Russian.) M. V. Dekhtiar and L. M. Dekhtiar. *Doklady Akademii Nauk SSSR*, new ser., v. 81, Dec. 1, 1951, p. 533-536.

Nearly square hysteresis loops were obtained from permalloy (Fe-Ni alloy) wires recrystallized under a tensile load close to the yield point. Data are charted. (P16, Fe, Ni)

165-P. Temperature Variation of Magnetic Hysteresis in Highly Coercive Alloys. (In Russian.) Ia. S. Shur, N. A. Baranova, and V. A. Zaikova. *Doklady Akademii Nauk SSSR*, new ser., v. 81, Dec. 1, 1951, p. 557-560.

Studied for Alnico (51% Fe, 24%

Co, 14% Ni, 8% Al, 3% Cu) samples between 195 and 550° C. Data are charted. (P16, Fe, SG-n)

166-P. The Influence of Deformation on the Potentials of Metals. (In Russian.) E. M. Zaretskii. *Zhurnal Prikladnoi Khimii,* v. 24, June 1951, p. 614-623.

See abstract of "Deformation and Corrosion", *Chemical Age;* items 344-R and 368-R, 1951.
(R11, Q24, Mg, Al, Cu, Zn, ST)

167-P. Chemical Thermochemistry and Thermodynamics. (In Spanish.) Jose Manuel Pertierra. *Técnica Metallurgica,* v. 7, Aug. 1951, p. 281-295.

Volatilization of metals during melting, Dalton's law of partial pressures, thermodynamics of chemical reactions, variation of enthalpy and free energy with temperature, specific heat of iron, heat of the α-Fe/γ-Fe and reverse transformations; specific heat of iron oxides; free energy of formation of FeO and Fe_2O_3; solution of FeO in molten Fe; and composition of the oxide film on Fe. Data are tabulated and charted. (P12, Fe)

168-P. Mercury; the Purest Metal. J. B. Lawrence. *Instruments,* v. 25, Mar. 1952, p. 310-312, 363.

When is mercury clean? How is mercury cleaned? Why does skin reform on "clean" mercury? Answers to these questions. (P10, Hg)

169-P. Type 416 Retains Magnetic Properties at 450° F. R. H. Esling. *Iron Age,* v. 169, Mar. 20, 1952, p. 106-108.

Type 416 stainless steel was investigated for use in a controller governing a high-temperature, high-pressure corrosive fluid system. It was found that this alloy's magnetic properties undergo no significant change. Amount of hysteresis is slightly decreased at 450° F. A specially designed, Fahy-type permeameter was used in tests. Data are tabulated and graphed. (P16, SS)

170-P. The Reduction of Nickel Oxide by Hydrogen. Giuseppe Parravano. *Journal of the American Chemical Society,* v. 74, Mar. 5, 1952, p. 1194-1198.

The reaction was studied in the range 150-350° C. and initial pressures of H_2 of 200-500 mm. Addition of foreign ions to NiO affects both rate and activation energy for reduction. These effects are related to the change in electronic properties of the oxide. 13 ref. (P13, P15, Ni)

171-P. The Solubility of Cadmium in Mixtures of Cadmium Chloride With Other Chlorides. Daniel Cubicciotti. *Journal of the American Chemical Society,* v. 74, Mar. 5, 1952, p. 1198-1200.

Solubility of Cd in mixtures of $CdCl_2$ with the chlorides of K, Ca, Ce, Mn, Mg, and Zn was determined at 740° C. Addition of any of these salts reduced the solubility. Effectiveness in reducing solubility is compared with anion-to-cation ratio of the salt and electropositiveness of the metal of the cation. (P13, Cd)

172-P. The Variation With Wavelength of the Spectral Emissivity of Iron and Molybdenum. Jack Eldon Taylor. *Journal of the Optical Society of America,* v. 42, Jan. 1952, p. 33-36.

Presents a study on the above. A gradual rise in the emissivity for both metals was observed as the blue end of the spectrum is approached. The increase in the emissivity of iron with decrease in wavelength is much greater than that observed for molybdenum. The emissivity of iron in the body-centered form at temperatures below 1178° K is observed to be higher at all wavelengths than it is for the higher-temperature face-centered cubic form. (P17, Fe, Mo)

173-P. Analysis of the Excitation Characteristics of Spectra Emitted by Ferrous Alloys. J. K. Hurwitz and J. Convey. *Journal of the Optical Society of America,* v. 42, Jan. 1952, p. 24-30.

The excitation potentials of the observed wavelengths of the spectral lines emitted in low-alloy steel spectra are calculated. The slopes of the working curves were found to be independent of alloying elements, matrix, and discharge conditions. Alterations in the circuit parameters and consequent changes in the discharge had little or no influence upon the intercept of the working curves. 19 ref. (P17, AY)

174-P. Competitive Adsorption From Solution Between Hydrophobic and Hydrophilic Molecules and Ions. R. L. Merker and W. A. Zisman. *Journal of Physical Chemistry,* v. 56, Mar. 1952, p. 399-404.

Refers to Pt foil and effects of varying pH, dissociation constant, and concentration. Generalizes results to include other unreactive metals; and extends usefulness to corrosion inhibition, electrode phenomena, and aqueous lubricants. 15 ref. (P13, R10)

175-P. The Adsorption of Hydrophobic Monolayers of Carboxylic Acids. Hayward R. Baker, Elaine G. Shafrin, and William A. Zisman. *Journal of Physical Chemistry,* v. 56, Mar. 1952, p. 405-412.

The adsorption technique reported previously was successfully extended to the study of monolayers physi-

cally adsorbed onto Pt from aqueous solutions of a variety of mono-and dicarboxylic acids. A new "thermal-gradient method" for using a pure, molten compound was found by which adsorbed, close-packed monolayers can be prepared and isolated on metal in the absence of solvent. 18 ref. (P13, Pt)

176-P. Adiabatic Magnetization of Super-Conductors. K. Mendelssohn. *Nature,* v. 169, Mar. 1, 1952, p. 366.

With respect to methods for obtaining temperatures below 1° K., an equation is given which shows that using metals with high T_c and high θ, such as Ta and Cb, one can, when starting at about 1° K., reach temperatures well below 0.1° K. While the cooling efficiency is lower than in the paramagnetic method, the necessary fields are also smaller and therefore permit a larger volume to be cooled. Best application of the method would, however, not be as a rival but as a supplement to the paramagnetic one. (P16, Ta, Cb)

177-P. The Natural Radioactivity of Rubidium. S. C. Curran, D. Dixon, and H. W. Wilson. *Philosophical Magazine,* ser. 7, v. 43, Jan. 1952, p. 82-92.

Results of investigations. 26 ref. (P13, Rb)

178-P. Metallic Conduction—the Internal Size Effect. An Addendum. D. K. C. MacDonald. *Philosophical Magazine,* ser. 7, v. 43, Jan. 1952, p. 124-125.

The Hall effect in metals at low temperatures, especially those exhibiting the anomalous minimum of electrical resistance. (P15)

179-P. Vibration Frequencies in Diatomic Molecules and in Solid Metals. E. C. Baughan. *Transactions of the Faraday Society,* v. 48, Feb. 1952, p. 121-128.

An empirical generalization is pointed out between the Debye frequencies of metallic solids and diatomic molecular vibration frequencies predicted by a formula due to Guggenheimer. Some implications for the theory of metallic valency. Data are tabulated. 18 ref. (P10)

180-P. Thermal Expansion Coefficients of α-Monoclinic Selenium. (In English.) Clarence J. Newton and Malcolm Y. Colby. *Acta Crystallographica,* v. 4, Sept. 1951, p. 477.

Results of determination by X-ray diffraction methods. (P11, Se)

181-P. New Highly Coercive, High-Permeability, High-Loss Ferromagnetic Materials. (In French.) Charles Guillaud. *Journal des Recherches du Centre National de la Recherche Scientifique,* Dec. 1951, p. 69-87.

A general review. Experiments with magnets produced by casting and by powder metallurgy; with Fe-Si, Fe-Ni, Fe-Mn, and Fe-Co-Ni alloys; and with ferrites. Applications. Tables, diagrams, and graphs. 45 ref. (P16, SG-n, p, Fe, Ni, Co, Mn)

182-P. Radiofrequency Measurement of Surface Layers on Metals. (In French.) R. G. Chambers. *Revue de Métallurgie,* v. 49, Jan. 1952, p. 65-66.

Results of some measurements dealing with the resistivity of surface layers of metals at high frequency and low temperature. (P15)

183-P. Highly Conductive Alloys. (In French.) W. W. Kee. *Revue de Métallurgie,* v. 49, Feb. 1952, p. 89-98.

Discusses two groups of Cu alloys — those which can be heat treated and those which cannot, with respect to their electrical conductivity, mechanical properties, and microstructure.
(P15, Q general, M27, Cu)

184-P. Progress in Knowledge Concerning the Metallic State: "Exo-Electrons". (In French.) J. Bergier and F. LeLionnais. *Revue Générale des Sciences pures et appliqueés,* v. 58, Nov. 11, 1951, p. 341-349.

A general review of a new type of electron emission which occurs when an allotropic transformation releasing energy takes place in a metal. Various techniques and results of experiments. (P15, N6)

185-P. New Method Which Permits Measurement of Hall Effect in Series and in Parallel. (In French.) A. L. Perrier. *Helvetica Physica Acta,* v. 24, Dec. 31, 1951, p. 637-641.

The method and its advantages over the traditional method. (P15)

186-P. Remarks on Fröhlich's Theory of Super Conductivity. (In German.) M. R. Schafroth. *Helvetica Physica Acta,* v. 24, Dec. 31, 1951, p. 645-662.

Theoretical, mathematical analysis. 11 ref. (P15)

187-P. Influence of Cobalt on the Properties of Cementite. (In French.) A. Michel and J. Drain. *Revue de Métallurgie,* v. 49, Feb. 1952, p. 114-116.

Influence on the Curie point of Fe_3C, and the thermomagnetic transformations of Cobalt cementites. Includes charts. (P16, Co, Fe)

188-P. Changing the Electrical Resistance of Pure Metals at the Melting Point. (In German.) Horst Gerstenkorn. *Annalen der Physik,* ser. 6, v. 10, Jan. 1, 1952, p. 49-79.

If the metal is in the molten state, X-ray structure investigations must replace the mathematical method of establishing probable electron dispersion and thus its electrical re-

sistance. The method described permits determination of absolute specific resistance of solid and molten metals and the accurate liquid-solid resistance ratio at the melting point. Application to Li, Na, and K. 16 ref. (P15)

189-P. Development of Processes for Testing Ferromagnetic Materials. (In German.) Werner Jellinghaus. *Archiv für das Eisenhüttenwesen,* v. 22, Nov.-Dec. 1951, p. 401-410.

Reviews the literature. Permeability measurements of magnetically soft materials, measurement of the magnetic properties of permanent magnetic materials, and of magnetostriction. 54 ref. (P16, SG-n, p)

190-P. The Solubility of Oxygen in Iron Melts Under Ferrous Oxide, Silica, and Lime-Saturated Ferrous Oxide Slags at Temperatures of 1530-1700° C. (In German.) Wilhelm Anton Fischer and Hans vom Ende. *Archiv für das Eisenhüttenwesen,* v. 23, Jan.-Feb. 1952, p. 21-33; disc., p. 33.

Methods of chemical, metallographic, and X-ray analyses applied to this problem. Melting chemically pure iron oxide and lime in a soft-iron crucible at 1400-1450° C. yielded an isotherm in the CaO-FeO-Fe_2O_3 system which showed that, with increasing lime contents, the iron oxide content of the molten slag increases in equilibrium with iron, forming a lime ferrite. Graphs, tables, photomicrographs, X-ray diagrams, and numerous references. (P12, Fe, ST)

191-P. Differences in Behavior of Ferromagnetic Substances in Small Magnetic Fields and in the Nonmagnetic State. (In German.) Hermann Fahlenbrach. *Archiv für das Eisenhüttenwesen,* v. 23, Jan.-Feb. 1952, p. 47-51.

Experimental examples show that the externally nonmagnetic behavior of a ferromagnetic substance depends on the method of demagnetization. An attempt is made to explain the differences in behavior after demagnetization by shock, and suitable annealing. Data are charted. 13 ref. (P16, SG-n, p)

192-P. Research on Suitable Compositions of Permanent-Magnet Steels Containing About 4% Cr, 2% Co, and 0.5% W (Co 040). (In German.) Walter Knorr. *Archiv für das Eisenhüttenwesen,* v. 23, Jan.-Feb. 1952, p. 53-55; disc., p. 55.

On the basis of 41 melts, effects of C, Cr, Co, W, and Co+W on magnetic properties of above steels were investigated. Co and W were found to have the greatest effect. Recommended composition. Data are graphed and tabulated. (P16, SG-n, AY)

193-P. Solution of Iron by Dilute Sulfuric Acid in a Magnetic Field. F. Blaha. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften,* v. 83, Feb. 15, 1952, p. 248-250.

Tabulated data confirm Ehrenhaft's discovery that a magnetic field increases the evolution of oxygen due to solution of Fe in dilute H_2SO_4. (P13, Fe)

194-P. Density and Specific Volume of Liquid and Solid Gold-Silver Alloys. (In German.) Erich Gebhardt and Stefan Dorner. *Zeitschrift für Metallkunde,* v. 42, Dec. 1951, p. 353-358.

Experiments using an indirect float method and an NaCl melt. Density and specific volume of pure Au, pure Ag, and the 10-90, 20-80, 40-60, 60-40, and 80-20 Au-Ag alloys, were determined between the liquidus temperature and 1300° C. Thermal expansion coefficient, as well as density and specific volume of the same compositions, between 20° C. and the solidus temperature. Shrinkage during solidification and while cooling in the solid state. Data are tabulated and charted. 27 ref. (P10, P11, Au, Ag)

195-P. Increase in the Rate of Viscous Flow of Metals in the Electrolyte During Electrochemical Polarization. (In German.) August Pfützenreuter and Georg Masing. *Zeitschrift für Metallkunde,* v. 42, Dec. 1951, p. 361-370.

Results of measurement for Pb, Zn, Ag, Au, and Pt in the air and in an electrolyte. Possible explanation of the observed behavior. Data are tabulated and charted; apparatus is diagrammed. 11 ref. (P15, Pb, Zn, Ag, Au, Pt)

196-P. Active Components of Ultrasonic Generation by Means of Ferromagnetic Powders. (In German.) Hans Heinrich Rust and Peter Pilz. *Zeitschrift für angewandte Physik,* v. 3, Oct. 1951, p. 379-382.

Ferromagnetic powders containing silicon seem to show a particularly large effect, and can thus be used for continuous ultrasonic generation. Results are tabulated and charted. (P10, SG-n, p)

197-P. Several Observations on the Formation of Potentials of Aluminum in Common Salt Solutions. (In German.) Richard Ergang, Georg Masing, and Margret Mohling. *Zeitschrift für Elektrochemie Berichte der Bunsengesellschaft für Physikalische Chemie,* v. 56, Jan. 1952, p. 8-16.

Reviews literature on the potentials of Al with different surface conditions in NaCl solutions. Concentration of Cl ions was found to have no effect on the equilibrium potential. Data are graphed and tabulated. 16 ref. (P15, Al)

198-P. The Problem of Minimum Resistance of Magnesium at Low Temperatures. (In Russian.) L. S. Kan and B. G. Lazarev. *Doklady Akademii Nauk SSSR,* new ser., v. 81, Dec. 21, 1951, p. 1027-1029.

The resistance of Mg of high purity (99.99%) was measured at low temperatures (down to 1.325° K.). The method of preparation and testing. Data are charted. (P15, Mg)

199-P. Impulse Method for Determining Heat Capacity. (In Russian.) V. I. Khotkevich and N. N. Bagrov. *Doklady Akademii Nauk SSSR,* new ser., v. 81, Dec. 21, 1951, p. 1055-1057.

Method developed for measuring the heat capacity of metals in wire form. The apparatus and typical curves. (P12)

200-P. The Problem of Measuring Losses in Steels. (In Russian.) M. A. Rozenblat. *Doklady Akademii Nauk SSSR,* new ser., v. 81, Dec. 21, 1951, p. 1059-1062.

A system for measuring and calculating electrical losses in steel cores subjected to alternating current is described in theoretical and mathematical terms. (P15, ST)

201-P. Influence of Oxygen Adsorbed on Platinum on the Variation of Contact Potential. (In Russian.) T. V. Kalish and R. Kh. Burshtein. *Doklady Akademii Nauk SSSR,* new ser., v. 81, Dec. 21, 1951, p. 1093-1096.

Investigated over the range 20-800° C. Data are charted. (P15, Pt)

202-P. Values of Effective Ionic Radii of Elements in the Molten and Solid States at High Temperatures. (In Russian.) S. I. Sobol. *Zhurnal Prikladnoi Khimii,* v. 24, July 1951, p. 710-719.

The necessity of correcting values of atomic radii determined at room temperature for describing conditions at high temperatures. Data for various metals and alloys are tabulated and charted. 11 ref. (P15)

203-P. The Surface Energies of Metals and Alloys. C. J. Leadbeater. "Powder Metallurgy", His Majesty's Stationery Office (London), 1951, p. 1-21.

Relationships between surface energy and melting point, binding energy, atomic volume, compressibility and density divided by atomic weight were determined for large number of nonferrous metals. Influence of surface energy on surface lattice parameter and on viscous flow during sintering. 32 ref. (P10, H11)

204-P. The Adsorption of Gases on Metal Filaments, Films, and Single Crystals. Albert D. Crowell. *American Journal of Physics,* v. 20, Feb. 1952, p. 89-98.

Concepts involved in the study of adsorption of gases on solids. Particular stress is placed on the problem of uniform surfaces. A historical study is specifically concerned with metal filaments and evaporated films, and surfaces of metal single crystals, both considered as approximations to ideal surfaces for adsorption measurements. (P13)

205-P. Hall Effect and Ponderomotive Force in Simple Metals. Norman Rostoker. *American Journal of Physics,* v. 20, Feb. 1952, p. 100-107.

The Bloch-Sommerfeld theory of conductivity was applied to the calculation of momentum lost by conduction electrons because of collisions with the crystal lattice. The calculations provide the basis for a microscopic interpretation of the ponderomotive force. (P15)

206-P. Determination of Thermal Conductivity of Copper and Deoxidized Copper-Iron Alloys; Apparatus and Technique. M. J. Goglia, G. A. Hawkins, and J. E. Deverall. *Analytical Chemistry,* v. 24, Mar. 1952, p. 493-496.

A small laboratory apparatus for use in measuring thermal conductivity of Cu specimens containing small amounts of Fe. Apparatus is also suitable for studies in connection with other metals. Data for temperatures of 150, 300, and 500° F. Tables, charts, and apparatus diagram. (P11, Cu)

207-P. Some Measurements of the Total Emissivity of Metals and Pure Refractory Oxides and the Variation of Emissivity With Temperature. A. H. Sully, E. A. Brandes, and R. B. Waterhouse. *British Journal of Applied Physics,* v. 3, Mar. 1952, p. 97-101.

A method for rapid determination of the total emissivity of metals and oxides in the range 300-800° C. Values were obtained for lampblack and polished Pt and also for Nimonic 75, pure Ni, and stainless steel, having various surface conditions. The total emissivities of the pure oxides ceria, zirconia, thoria, magnesia, alumina, and fused silica were also determined. Effect of particle size of the oxides and of variation of emissivity with angle of emissions was studied. 10 ref. (P17, Ni, SS, Pt)

208-P. The Effect of Orientation and Shape on the Settling Velocity of Non-Isometric Particles in a Viscous Medium. John F. Heiss and James Coull. *Chemical Engineering Progress* (Engineering Section), v. 48, Mar. 1952, p. 133-140.

Al and Cr alloy steel spheres were used in determining the viscosity of the fluids by the falling-sphere method. Data on the physical properties of these spheres are tabulated. 28 ref. (P general, T8, Al, AY, Cr)

209-P. Vapor Pressures of Inorganic Substances. VIII. Molybdenum Between 2151 and 2462° K. James W. Edwards, Herrick L. Johnston, and Paul E. Blackburn. *Journal of the American Chemical Society,* v. 74, Mar. 20, 1952, p. 1539-1540.

Includes values calculated for heat of sublimation at absolute zero and equations formulated for vapor pressure as a function of temperature. 12 ref. (P12, Mo)

210-P. The Thermal Conductivity of Metals at High Temperature. C. L. Hogan and R. B. Sawyer. *Journal of Applied Physics,* v. 23, Feb. 1952, p. 177-180.

A modification of the Forbes bar method in the range 25-1000° C. A mathematical analysis is presented. Electrical and thermal conductivities of commercial "A" nickel, Inconel, several stainless steels, and 1010 steel. (P11, P15, Ni, SS, CN)

211-P. Considerations Regarding the Distribution of Radiation Damage in Matter Bombarded by Light Ions and a Method of Making It Uniform. Philip Schwed and Gerhart Groetzinger. *Journal of Applied Physics,* v. 23, Feb. 1952, p. 234-236.

A quantitative estimate of the spatial distribution of the radiation damage produced by mono-energetic ions. A simple method whereby uniform radiation damage can be produced in a relatively thick sample by the use of ions whose range equals the thickness of the sample. Discusses, specifically, 20-Mev. deuterons impinging on Cu. (P13, Cu)

212-P. Secondary Electron Emission From Metals Under Positive Ion Bombardment in High Extractive Fields. E. W. Webster, R. J. Van de Graafe, and J. G. Trump. *Journal of Applied Physics,* v. 23, Feb. 1952, p. 264-266.

As part of a study of breakdown mechanisms in high vacuum, experiments with hydrogen ions show that emission is small and increases only slowly with the electric field strength at the bombarded surface. Results are plotted for steel wires and both H_1+ and H_2+ ions. (P15)

213-P. The Measurement of Ultrasonic Attenuation in Solids by the Pulse Technique and Some Results in Steel. R. L. Roderick and Rohn Truell. *Journal of Applied Physics,* v. 23, Feb. 1952, p. 267-279.

Pulse techniques were extended and refined to obtain dependable measurements over the range of 5-50 megacycles. Understanding of relative importance of beam spreading, geometrical boundaries, and method of coupling was improved. Coupling by means of water buffer and direct mounting. Attenuation measurements were made on Cr-Mo steel. Data are tabulated and graphed; photomicrographs. 18 ref. (P10, AY)

214-P. A Modified Dew-Point Method for Vapour-Pressure Measurements of Lead-Mercury Alloys. B. R. Burgan, R. C. Hall, and R. F. Hehemann. *Journal of the Institute of Metals,* v. 80, Mar. 1952, p. 413-414.

The vapor pressure of mercury over several Pb-Hg alloys covering a wide range of composition was determined for a range of temperatures. The activities of Hg and of Pb were calculated for 324° C., and found to agree well with the results of Hildebrand, Foster, and Beebe. (P12, Hg, Pb)

215-P. The Infrared Properties of Gold Smoke Deposits. Louis Harris and John K. Beasley. *Journal of the Optical Society of America,* v. 42, Feb. 1952, p. 134-140.

New experimental results. Interpretation is based on application of classical electromagnetic theory. The gold smoke deposits are assumed to interact with infrared radiation as if they were sheets of an essentially uniform material which is characterized by an average electrical conductivity small compared to that of ordinary metals. The electrical conductivity of gold black deposits was found to be about 10^5 times that of bulk gold, and the volume percent of gold in a gold black deposit was found to be about 0.2%. (P17, Au)

216-P. The Specific Heats of Germanium and Grey Tin at Low Temperatures. R. W. Hill and D. H. Parkinson. *Philosophical Magazine,* ser. 7, v. 43, Mar. 1952, p. 309-316.

Specific heats were measured from liquid helium temperatures to 170 and 110° K. respectively. Shows that previous data on Ge are not valid for pure material, and that temperature variations of the Debye characteristic temperatures of these elements are very large. Enthalpy, entropy, and free-energy values are tabulated. 13 ref. (P12, Ge, Sn)

217-P. A Calculation of the Cohesive Energies and Pressure-Volume Relations of the Divalent Metals. S. Raimes. *Philosophical Magazine,* ser. 7, v. 43, Mar. 1952, p. 327-337.

A method for calculating the energy of the lowest state of a divalent metal, which renders unnecessary explicit calculation of an ion-core field. An expression for total energy of valence electrons is obtained, and applied to calculation of atomic radii, compressibilities, and cohesive energies. Calculated change of volume for up to 100,000 kg. per sq. cm. agree with the experimental data of Bridgman. Data for Mg, Ca, Sr, Ba, Zn, Cd, and Be are charted and tabulated. (P12)

218-P. The L Absorption Spectrum of Nickel. An Anomaly. Y. Cauchois. *Philosophical Magazine,* ser. 7, v. 43, Mar. 1952, p. 375.

Briefly discusses fact that the L_{III} absorption edge does not coincide with emission edge. (P17, Ni)

219-P. Intrinsic Magnetization in Alloys. W. J. Carr, Jr. *Physical Review,* ser. 2, v. 85, Feb. 15, 1952, p. 590-594.

The intrinsic magnetization of alloys among the iron transition group of metals is explained using a Heitler-London model for the 3d electrons. The magnetic moment associated with each atom is determined by the principle of maximum spin and the sign of the interaction between neighboring parts from the overlap of the wave functions. It is found that a large number of alloys derive their spontaneous magnetization from an antiparallel arrangement of atomic spins. (P16, SG-n)

220-P. The Scattering of 0.5-Mev. Circularly Polarized Photons in Magnetized Iron. Forrest P. Clay and Frank L. Hereford. *Physical Review,* ser. 2, v. 85, Feb. 15, 1952, p. 675-676.

Forward-direction Compton electrons from two magnetized Fe foils were detected by two thin stilbene crystals covered by Al foil. Scintillations were recorded by a fast coincidence circuit, and rates were measured for each of the four possible configurations of the magnetic fields. Data from 12 independent runs and the difference in coincidence rates for the indicated field configurations. (P16, Fe)

221-P. Properties of Thermally Produced Acceptors in Germanium. C. S. Fuller, H. C. Theuerer, and W. van Roosbroeck. *Physical Review,* ser. 2, v. 85, Feb. 15, 1952, p. 678-679.

Experimental data on the p-n transformation of Ge. Graphs show variation of acceptor concentration with temperature and calculated and observed values of resistivity. (P15, M26, Ge)

222-P. The Drift Mobility of Electrons in Silicon. J. R. Haynes and W. C. Westphal. *Physical Review,* ser. 2, v. 85, Feb. 15, 1952, p. 680-681.

Mobility of electrons injected into p-type Si was determined by measuring transit times between emitter and collector points with single-crystal rods. A schematic diagram of the circuit used successfully with Si is shown. (P15, Si)

223-P. On the Theory of Electrical Conductivities of Monovalent Metals. A. B. Bhatia. *Proceedings of the Physical Society,* v. 65, sec. A, Mar. 1, 1952, p. 188-191.

A theoretical and mathematical treatment. (P15)

224-P. Density of States Curve for the 3d Electrons in Nickel. G. C. Fletcher. *Proceedings of the Physical Society,* v. 65, sec. A, Mar. 1, 1952, p. 192-202.

A calculation was made of the energy density of electronic states for Ni, using the approximation of tight binding. Theoretical basis of the approximation is outlined and validity of the underlying assumptions examined. Required overlap integrals are evaluated and the secular equation for energy as a function of wave vector is solved exactly over the energy range of interest for Ni. The density-of-states curve is computed graphically. (P10, Ni)

225-P. A Note on the Structure of Selenium. E. Billig. *Proceedings of the Physical Society,* v. 65, sec. B, Mar. 1, 1952, p. 216-221.

Reviews recent work, mainly on single crystals, with a view to clarifying the electrical conductivity of Se. (P15, Se)

226-P. Electronic Structures and Physical Properties in the Alloy Systems Nickel-Copper and Palladium-Silver. B. R. Coles. *Proceedings of the Physical Society,* v. 65, sec. B, Mar. 1, 1952, p. 221-229.

A comparison is made of the magnetic, electrical, and thermo-electric properties of alloys in the two systems. Lattice spacings, optical properties, electronic specific heat, and X-ray spectroscopy of the Ni-Cu alloys. (P general, Ni, Cu, Pd, Ag)

227-P. Anomalous Thermal Conductivity of Pure Metals at Low Temperatures. J. K. Hulm. *Proceedings of the Physical Society,* v. 65, sec. A, Mar. 1, 1952, p. 227-228.

Analyzes recent work on the ther-

mal and electrical conductivities of Na at low temperatures by Berman and Macdonald. Two types of discrepancy appear between their experimental data and the behavior predicted by the electron theory of metals. The discrepancy for Na at the lowest temperatures is essentially of the same type as that already well known for ten other metals, and originates in the fact that the observed coefficient of the T^2 term in the electronic thermal resistivity is nearly an order of magnitude lower than the theoretical value. Placing of special emphasis on Lorenz number for Na tends to obscure the fact that it is in the thermal resistivity rather than in the electrical resistivity that the main discrepancy occurs. 10 ref. (P11, Na)

228-P. Torque Curves and Other Properties of Permanent Magnet Alloys. K. Hoselitz and M. McCaig. *Proceedings of the Physical Society,* v. 65, sec. B, Mar. 1, 1952, p. 229-235.

Further investigations of Alcomax III and related alloys were made using a torque magnetometer. Torque curves were obtained after various sequences of heat treatment designed to throw light on the changes that occur in these alloys, and the magnitude and direction of the magnetic field applied during cooling was varied. A method of deriving three independent constants of crystal anisotropy without using single crystals was devised. (P16, Fe, Co, Ni, SG-n)

229-P. Magnetic Properties. P. W. Selwood. "Encyclopedia of Chemical Technology. Vol. 8" (Interscience Encyclopedia, New York), 1952, p. 617-624.

Theory of as well as magnetic behavior of the principal types of magnetic materials. 10 ref. (P16, SG-n, p)

230-P. Magnetic Substances. R. A. Chegwidden. "Encyclopedia of Chemical Technology. Vol. 8" (Interscience Encyclopedia, New York), 1952, p. 639-659.

Ferromagnetic materials and their properties. Tables and graphs show magnetic properties of various metallic and nonmetallic magnetic materials. 21 ref. (P16, SG-n, p)

231-P. Study of Electrolytic Phenomena With the Aid of Weak Alternating and Variable Frequency Currents. (In French.) Israel Epelboin. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Feb. 25, 1952, p. 950-952.

Variation of impedance of an electrolytic cell as a function of frequency was used to study electrode phenomena. In particular, there was noted a resonance related to the appearance of a diffusion layer around electrodes which are susceptible to selective dissolution. Characteristics of Ni and Pt electrodes in an acetic-perchloric acid bath were studied. Data are charted. (P15, L17, N1, Pt)

232-P. Experimental Confirmation of Electrochemical Theory of Liquid Alloys in the Iron-Carbon-Silicon System. (In Russian.) O. A. Esin and L. K. Gavrilov. *Izvestiia Akademii Nauk SSSR,* Section of Technical Sciences, Aug. 1951, p. 1234-1242.

The emf.s developed between pairs of molten alloys of the above system were determined. The data are tabulated and charted for alloys containing 0.65-43.0 Si and 0.20-4.48% C. (P15, Fe, Si)

233-P. Phenomena Associated With the Flight of Ultra-Speed Pellets. Part III. General Features of Luminosity. John S. Rinehart, William A. Allen, and W. C. White. *Journal of Applied Physics,* v. 23, Mar. 1952, p. 297-299.

Ultra-speed pellets of the lighter metals such as Al and Mg generate intensely luminous trails when fired through air. A pronounced characteristic of the luminous trails is the intermittent manner in which the light is emitted. Brightness, luminous output, and temperature of the trail generated by an Al pellet were measured. Includes photographs of pellets in flight. (P17, Al)

234-P. Domain Structure of Perminvar Having a Rectangular Hysteresis Loop. H. J. Williams and Matilda Goertz. *Journal of Applied Physics,* v. 23, Mar. 1952, p. 316-323.

Investigation for a Perminvar containing 43% Ni, 34% Fe, and 23% Co. Effect of superposing an applied alternating field was also investigated, and an effective permeability of 4,000,000 was obtained. 14 ref. (P16, Ni, Fe, Co, SG-n)

235-P. Correlation of D.C. and Microsecond Pulsed Emission From Oxide Coated Cathodes. Frank A. Horak. *Journal of Applied Physics,* v. 23, Mar. 1952, p. 346-349.

A study of emission from oxide-coated cathodes prepared on four different base metals. One of the base metals was pure electrolytic Ni and the other three had impurities of 0.2% Si, and 4.7% W added to the Ni. The flat base-metal cathode was coated with equal molar Ba-Sr carbonate. The tubes were placed on life test at a cathode temperature of 1125° K. with no emis-

sion current drawn. D.C. and pulsed emission measurements were taken periodically. Three methods were used to measure the zero-field emission current. Results show that the different cathode base metals control the variation in emission with life. 13 ref. (P15, Ni)

236-P. The Mechanism of the Cathodic Hydrogen Evolution Reaction. J. O'M. Bockris and E. C. Potter. *Journal of the Electrochemical Society,* v. 99, Apr. 1952, p. 169-186.

Some of the outstanding problems of concept and mechanism in the field of cathodic-hydrogen evolution kinetics. A full derivation and correlation of kinetic equations, assuming no mechanism, reveals expressions for several parameters which take values specific to one or more mechanisms. Includes discussion of specific mechanisms for Hg, Ag, Ni, and Pt cathodes. 27 ref. (P13, Hg, Ag, Ni, Pt)

237-P. Joint Discussion on the Papers—Metallography of Carbon in Silicon-Iron Alloys Containing 4% Silicon, by E. D. Harry; The Variation in Electrical Properties of Silicon-Iron Transformer Sheet, by S. Rushton and D. R. G. Davies. *Journal of the Iron and Steel Institute,* v. 170, Mar. 1952, p. 232-237.

Papers published in Mar. 1951 issue; item 145-P, 1951. (P15, Fe)

238-P. Magnetic Behavior of Intermediate Phases in Alloys of Transition Elements. P. A. Beck. *Journal of Metals,* v. 4, Apr. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 420.

Sigma-phase specimens of the following compositions were tested: 40-40-20 Fe-Cr-Mo; 35-35-30 Fe-Cr-Mo; 48.7-50.2-1.1 Fe-Cr-W; and 40.7-59.3 Co-Cr (all atomic percentages). All were paramagnetic at room temperature; but only the first alloy became ferromagnetic at liquid-N_2 temperatures. (P16, Fe, Cr, Mo, Co)

239-P. The Formation of a Boundary Between Normal-Conducting and Superconducting Metal. M. P. Garfunkel and B. Serin. *Physical Review,* ser. 2, v. 85, Mar. 1, 1952, p. 834-840.

It was found that there is a large difference between the magnetic field at which the superconducting-normal state transition occurs and the magnetic field at which the normal state-superconducting transition occurs. These results are in agreement with the thermodynamic theory of phase transition. Shows how hysteresis determines the ratio of this surface energy to a characteristic dimension of the superconductor. A measure of this ratio is given between 3.37 and 3.68° K. for superconducting tin. 17 ref. (P15, Sn)

240-P. The Origin of High Permeability in Permalloy. Soshin Chikazumi. *Physical Review,* ser. 2, v. 85, Mar. 1, 1952, p. 918-919.

Alloys of the composition near Ni_3Fe have unusual magnetic properties sensitive to heat treatment. These properties were investigated in connection with formation of a superlattice at 490° C., and explained in terms of "directional order". Micrographs show domain patterns. (P16, Ni, Fe)

241-P. Resistivity of Evaporated Tellurium Films. Takemaro Sakurai and Seiji Munesue. *Physical Review,* ser. 2, v. 85, Mar. 1, 1952, p. 921.

A Te film was made on a substrate of a silica plate by vacuum evaporation, and its resistivity measured at various temperatures. The thickness of film was varied from 200 to 5000 A. Results are charted. (P15, Te)

242-P. The Stopping Power of a Metal for Charged Particles. David Pines. *Physical Review,* ser. 2, v. 85, Mar. 1, 1952, p. 931.

Theoretical, mathematical analysis. (P15)

243-P. Conductivity of Cold-Worked Metals. D. L. Dexter. *Physical Review,* ser. 2, v. 85, Mar. 1, 1952, p. 936-937.

In a recent paper, Landauer computed the change in conductivity using as a scattering potential the energy of the bottom of the conduction band, calculated from free-electron theory, in a lattice containing a single edge-type dislocation. This note extends and modifies these results. Effect of singularity in the assumed scattering potential. (P15)

244-P. Experiments With Audiofrequencies on Superconductors. B. Serin and C. A. Reynolds. *Physical Review,* ser. 2, v. 85, Mar. 1, 1952, p. 938-939.

Discusses in greater detail certain points in a recent paper under the above title, in response to an earlier paper of Galkin and Bezuglyi which criticized their conclusions. Work was done on superconducting tin. (P15, Sn)

245-P. Properties of Thin Layers of Superconductive Metals. (In Russian.) N. V. Zavaritskii. *Doklady Akademii Nauk SSSR,* new ser., v. 82, Jan. 11, 1952, p. 229-231.

Properties of layers of Sn and Tl less than 15 atoms thick were investigated between 2 and 50° K. Data are charted. (P15, Sn, Tl)

246-P. (Book) **Industrial Heat Transfer.** F. W. Hutchinson. 326 pages. Industrial Press, 148 Lafayette St., New York 13, N. Y. $6.00.

Presents and discusses equations finding the widest industrial applications, analyzes their applicability, and provides graphs which permit direct visual solutions of the most commonly encountered problems. (P11, J general)

247-P. (Book) **Thermodynamics of Alloys.** Carl Wagner. 161 pages. 1952. Addison-Wesley Press, Inc., Cambridge 42, Mass. $6.50. (Translated and revised by Svante Mellgren and J. H. Westbrook from *Handbuch der Metallphysik,* v. 1, Pt. 2, (Akademische Verlagsgesellschaft Becker and Erler Kom.-Ges., Leipzig, 1940).

In addition to the discussion of new methods and the data abstracted from papers published between 1940 and 1951, contains new sections on ternary and higher-order systems, empirical formulas, and relations between thermodynamic functions and the electronic constitution of alloys. Emphasis is on principles, but many data for specific systems illustrate the application of general relations. Alloy index and biblography of 419 entries. Includes the thermodynamics of metallic phases involving such nonmetallic elements as hydrogen, carbon, nitrogen, sulfur, or phosphorus. (P12, M24, N general)

248-P. Photoconductivity in Vacuum Coated Selenium Films. Paul H. Keck. *Journal of the Optical Society of America,* v. 42, Apr. 1952, p. 221-225.

Results of an investigation. Graphs and tables. (P17, L25, Se)

249-P. The Dissolution of Metals Over the Temperature Range of 25 to −60°. II. The Dissolution of Cadmium in Hydrochloric Acid-Methyl Alcohol-Water Solutions. A. B. Garrett and J. R. Heiks. *Journal of Physical Chemistry,* v. 56, Apr. 1952, p. 449-451.

Data were obtained under static and dynamic conditions, in the presence and absence of a depolarizer over the temperature range of 25 to −60° C. Energy of activation of the static depolarized process is in the order of 4000 cal. per mole and of the nondepolarized process is about 10,000 cal. per mole. The nondepolarized dissolution process is first order with respect to the acid concentration. Graphs and tables. (P13, Cd)

250-P. Dual Adsorption of Polar Organic Compounds on Steel. Norman Hackerman and E. L. Cook. *Journal of Physical Chemistry,* v. 56, Apr. 1952, p. 524-526.

Study on the degree of specificity of adsorption of steel powder toward various functional groups. Graphical data. (P13, ST)

251-P. Solid Surface Energy and Calorimetric Determinations of Surface-Energy Relationships for Some Common Minerals. A. Kenneth Schellinger. *Mining Engineering,* v. 4, Apr. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 193, 1952, p. 369-374.

Methods used to determine surface energies on solids. New data on surface-energy relationships for quartz, glass sand, crystalline NaCl, specimen-grade pyrite, and specimen-grade calcite. Obtained by a technique combining calorimetric determination of energy and BET surface area measurement. Tables, graphs, apparatus diagrams. 19 ref. (P10)

252-P. Phase Transitions in Adsorbed Films. Lothar Meyer and Earl Long. *Physical Review,* ser. 2, v. 85, Mar. 15, 1952, p. 1035-1037.

A thermodynamic treatment of first and second-order transitions in adsorbed layers. The results are compared with the experimental evidence for the melting of argon and the transition HeI-HeII in adsorbed layers. (P12)

253-P. Radiations of Rh^{99}, Rh^{101}, Rh^{105}, and Ru^{105}. C. L. Scoville, S. C. Fultz, and M. L. Pool. *Physical Review,* ser. 2, v. 85, Mar. 15, 1952, p. 1046.

Ruthenium metal of high purity was bombarded with 6.3-Mev protons and 10-Mev deuterons and the spectra of the activities obtained were examined in a 180° beta-ray spectrometer. The spectrometer sources consisted of the activated metal spread out evenly on thin Zapon foil ribbons. The source and backing had a thickness of about 15 mg. per sq. cm. (P13, Rh, Ru)

254-P. Energy Absorption During Twin Formation in Zinc Single Crystals. E. I. Salkovitz. *Physical Review,* ser. 2, v. 85, Mar. 15, 1952, p. 1046-1047.

Measured by means of ballistic pendulums in measuring the energy absorbed during kink formation in Zn and Cd. (P12, Zn)

255-P. The Scattering of 9.6-Mev Protons by Carbon, Aluminum, and Magnesium. C. J. Baker, J. N. Dodd, and D. H. Simmons. *Physical Review,* ser. 2, v. 85, Mar. 15, 1952, p. 1051-1052.

A remotely controlled scattering chamber was used to investigate the scattering of 9.6-Mev protons by some light nuclei. The source of protons was the extracted beam of the Birmingham 60-in. cyclotron.

The scattered particles were detected by a counter telescope consisting of three proportional counters which fed a flexible coincidence or anticoincidence circuit. (P13, Al, Mg)

256-P. Some Magnetic Properties of Metals. I. General Introduction, and Properties of Large Systems of Electrons. II. The Influence of Collisions on the Magnetic Behaviour of Large Systems. R. B. Dingle. *Proceedings of the Royal Society,* v. 211 ser. A, Mar. 20, 1952, p. 500-525.

Detailed mathematical, theoretical treatment. Part I includes a survey of problems to be covered in papers to be published later. 42 ref. (P16)

257-P. The Theory of Single-Domain Particles. (In Russian.) E. Kondorskii. *Doklady Akademii Nauk SSSR,* new ser., v. 82, Jan. 21, 1952, p. 365-368.

A theoretical discussion of single-domain, ferromagnetic particles. (P16)

258-P. Variation of Electrical Resistance of an Fe_3Pt Alloy in Linear Magnetic Fields. (In Russian.) R. G. Annaev, V. G. Dubrovskii, and E. K. Kapustian. *Doklady Akademii Nauk SSSR,* new ser., v. 82, Feb. 1, 1952, p. 549-552.

The electromagnetic properties of an Fe_3Pt alloy wire were studied over a range of magnetic fields and annealing temperatures (effect of ordering). Data are charted. 10 ref. (P15, P16, Fe, Pt)

259-P. Determination of Surface Tension of Materials at Their Melting Points. (In Russian.) V. I. Smirnova and B. F. Ormont. *Doklady Akademii Nauk SSSR,* new ser., v. 82, Feb. 11, 1952, p. 751-753.

Method for determination. Equations used to calculate values. Experimental data are tabulated for Fe, Ni, Cu, Au, Ag, Sn, and Bi. (P10)

260-P. Thermomagnetic Effect in Fe-Pt Alloy. (In Russian.) R. G. Annaev and M. V. Kolodin. *Doklady Akademii Nauk SSSR,* new ser., v. 82, Feb. 11, 1952, p. 697-700.

The effect of ordering (annealing temperature) and strength of the magnetic field. Data are charted. 10 ref. (P16, Fe, Pt)

261-P. Investigation of the Temperature Dependence of the Hall Effect in Electrolytic Iron. (In Russian.) V. V. Parfenov and V. R. Abel's. *Doklady Akademii Nauk SSSR,* new ser., v. 82, Feb. 21, 1952, p. 877-879.

Data charted. (P15, Fe)

262-P. Thermal and Thermoelectric Properties of Ferromagnetic Metals. A. I. Rezanov. *Doklady Akademii Nauk SSSR,* v. 82, Feb. 21, 1952, p. 885-887.

A theoretical, mathematical analysis. (P16, SG-n, p)

263-P. Permanent Magnets From Ultrafine Iron Powder. Bernard Kopelman. *Electrical Engineering,* v. 71, May 1952, p. 447-451.

Theory and properties. Magnets compare favorably with Alnico magnets. Diagrams and graphs. 10 ref. (P16, H general, Fe, SG-n)

264-P. The Heat of Solution of Neptunium Metal and the Heats of Formation of Some Neptunium Chlorides. A Microcalorimeter for Heat of Solution Measurements. Edgar F. Westrum, Jr., and LeRoy Eyring. *Journal of the American Chemical Society,* v. 74, Apr. 20, 1952, p. 2045-2047.

Values determined. A convenient precise calorimeter suitable for determination of heats of relatively rapid reactions for milligram quantities of materials, and its performance. Apparatus diagram and tables. 13 ref. (P12, Np)

265-P. Recovery of the Resistivity of Metals After Cold-Working. *Nature,* v. 169, Apr. 12, 1952, p. 623.

Measurements on the recovery of the electrical properties of Au, Ag, and Cu wires. Graph shows results. (P15, Cu, Ag, Au)

266-P. Study of the Distribution of Surface Potential by Means of Radioactive Deposits. T. Westermark and L. G. Erwall. *Nature,* v. 169, Apr. 26, 1952, p. 703-704.

Experiments on the contact potentials of polished metallic surfaces. A special camera of cylindrical form was constructed containing a radiothorium source. A uniform electric field can be maintined in the space between the source and a collecting disk. After exposure, the disk is removed and an autoradiograph prepared. The method has so far been applied only to a few alloys; but it is believed to be of rather general applicability provided the contact potential differences are not too small. (P15)

267-P. Experiments on the Electrical Resistivity of Metals. D. K. C. MacDonald. *Philosophical Magazine,* ser. 7, v. 43, Apr. 1952, p. 479-481.

It has been found possible to adapt a Collins helium liquefier so that electrical conductivity measurements may be carried out continuously from room temperature down to the liquid He temperature range in a single experiment with satisfactory accuracy. Some measurements on Rb. (P15, Rb)

268-P. Neutron Transmission Cross Sections in the Kilovolt Region. Carl T. Hibdon, Alexander Langsdorf, Jr., and Robert E. Holland. *Physical Review,* ser. 2, v. 85, Feb. 15, 1952, p. 595-600.

Neutron transmission cross sections were measured with about 2 kev. resolution in the range 2-25 kev., and to high energies in some cases. Measurements at the lower energies were made possible by a collimator and shield around the counters, which reduced background, and by the high efficiency obtained by many counters embedded in an array in a paraffin moderator. Resonances were observed in Na, Ti, V, Mn, Fe, Co, and Ni. (P10, Na, Ti, V, Mn, Fe, Co, Ni)

269-P. Nuclear Elastic Scattering of High Energy Protons. R. E. Richardson, W. P. Ball, C. E. Leith, Jr., and B. J. Moyer. *Physical Review,* ser. 2, v. 86, Apr. 1, 1952, p. 29-41.

Differential elastic scattering cross sections of C, Mg, Al, Si, S, Cu, Ag, Ta, W, Pb, and Bi for 340-Mev protons. Apparatus diagrams and graphs. 17 ref. (P10)

270-P. Domain Patterns on FeSi Crystals. C. E. Ying, S. Levy, and R. Truell. *Physical Review,* ser. 2, v. 86, Apr. 1, 1952, p. 133-134.

Several interesting patterns found in a study of effect of magnetic history. Crystals contained 3.8% Si. Photomicrographs. (P16, Fe)

271-P. The Inelastic Scattering of Fast Neutrons From Iron. P. H. Stelson and W. M. Preston. *Physical Review,* ser. 2, v. 86, Apr. 1, 1952, p. 132-133.

A method for separating low-lying energy levels in intermediate weight nuclei. Apparatus diagram and graph. (P10, Fe)

272-P. Behavior of the Heat Capacity of Superconducting Niobium Below 4.5° K. A. Brown, M. W. Zemansky, and H. A. Boorse. *Physical Review,* ser. 2, v. 86, Apr. 1, 1952, p. 134-135.

Direct measurements of above property from 2.5 to 20° K. in both normal and superconducting phases. Graphs. (P15, Cb)

273-P. The Inelastic Scattering of Very Slow Neutrons by Iron. R. Latham and J. M. Cassels. *Proceedings of the Physical Society,* v. 65, sec. A, Apr. 1, 1952, p. 241-245.

The increase with temperature of the total cross section of iron for very slow neutrons was measured with the help of a cyclotron and a neutron velocity selector. 12 ref. (P10, Fe)

274-P. Some Magnetic Properties of Metals. III. Diamagnetic Resonance. IV. Properties of Small Systems of Electrons. R. B. Dingle. *Proceedings of the Royal Society,* ser. A, v. 212, Apr. 8, 1952, p. 38-65.

Electromagnetic radiation incident on a large system of electrons moving in a constant magnetic field H in a metal is strongly absorbed near a frequency represented by a given equation. Part IV: Calculation of the magnetic properties of a system of electrons contained within a cylinder of very small radius with its axis parallel to the field direction. The influence of electron spin on both steady and periodic terms. (P16)

275-P. Range-Energy Relations for Electrons and the Determination of Beta-Ray End-Point Energies by Absorption. L. Katz and A. S. Penfold. *Reviews of Modern Physics,* v. 24, Jan. 1952, p. 28-44.

Methods commonly used to determine the ranges of beta rays from absorption curves. A new method developed by the authors. Includes data for β-ray transmission and absorption by various thicknesses of Al. 61 ref. (P10, Al)

276-P. Physical Effects of High Pressure. P. W. Bridgman. *Times Review of the Progress of Science,* Spring 1952, p. 1-4.

Apparatus and techniques, and effects on compression of fluids and solids, freezing, polymorphic forms, atomic structure, fracture of steel, etc. (P general, Q general, M25, ST)

277-P. Slow Neutron Transmission of Thorium. W. W. Havens, Jr., and L. J. Rainwater. *U. S. Atomic Energy Commission,* AECD-3288, Apr. 17, 1951, 6 pages.

Results of investigation in various regions. (P10, Th)

278-P. Electrical Properties of Very Thin Silver, Aluminum, and Silicon Films. (In French.) André Blanc-Lapierre, Marcel Perrot, and Jean-Pierre David. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Mar. 10, 1952, p. 1133-1135.

Conductivity, at ordinary temperature, of thin pieces of Ag, Al, and Si, obtained by evaporation in a vacuum. Graphs and table. (P15, Ag, Al, Si)

279-P. Study of Thin Strips of Mumetal Subjected to Weak Alternating Fields as a Function of Temperature. (In French.) Claude Abgrall and Israel Epelboin. *Comptes Rendus hebdomadaires des Séances*

de l'Académie des Sciences, v. 234, Mar. 17, 1952, p. 1265-1267.

Calculation of the Foucault current applied to a homogeneous permanent magnet does not agree with that observed experimentally. This anomalous relationship between resistivity measured directly and that deduced by calculation was studied for mumetal containing Mo and annealed at 1100° C. (P15, P16, Ni)

280-P. Electrochemical Studies by the Radioactive-Tracer Method. (Electrolyses in Extremely Dilute Solutions.) (In French.) M. Haissinsky. *Experientia,* v. 8, Apr. 15, 1952, p. 125-132.

The ordinary methods of determining electrochemical potentials cease to be applicable in extreme dilution. Energy conditions for formation of very thin electrodeposits (less than a monoatomic layer) can then be explored by means of radioactive indicators, following particular polarization curves. Relationship between critical potential defined by such curves and theoretical potential computed from the Nernst equation for the given concentration. Experimental results are collected for critical potentials of deposition of Po, Bi, Pb, Ag, etc., from extremely dilute solutions onto various metals. Shows that the heterogeneity of the electrode surface plays a considerable role in these electrolyses. 74 ref. (P15)

281-P. Electrode Phenomena During Electrolysis. (In French.) E. Darmois. *Journal de Chimie Physique et de Physico-Chimie Biologique,* v. 49, Feb. 1952, p. C151-C153.

Formation of a layer of adsorbed ions at the electrode. Graphs show properties of various positive and negative ions. (P15)

282-P. Temperature Effects of Bismuth. (In German.) Hans Meissner. *Zeitschrift für angewandte Physik,* v. 4, Feb. 1952, p. 59-60.

Effect of temperature and time of annealing on the electrical resistance of Bi wire. Data are graphed. (P15, J23, Bi)

283-P. Methods of Measuring Polarization Potentials by Means of Model Experiments. (In German.) R. Piontelli, G. Bianchi, and R. Aletti. *Zeitschrift für Elektrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Feb. 1952, p. 86-93.

Effect of environmental conditions on results. Results for typical metallic ions are shown graphically and diagrammatically. 10 ref. (P15)

284-P. Theory on the Electrical Conductivity of Metals. I. (In German.) H. Koppe. *Zeitschrift für Naturforschung,* v. 7a, Feb. 1952, p. 156-161.

Continuation of a previous article. New definition of surface distribution and method of computing the diffusion constant, showing that a scalar diffusion constant can be obtained under certain simplified assumptions. Computation is based on numerous approximations, such as free electrons, low current strengths, and diffusion approximation. (P15)

285-P. Results of Low Temperature Research. IX. Atomic Heat of Cobalt Between 15 and 270° K. (In German.) Klaus Clusius and Liselotte Schachinger. *Zeitschrift für Naturforschung,* v. 7a, Feb. 1952, p. 185-191.

Experimentally investigated in order to study further the great effect of electrons on the specific heat of ferromagnetic metals. Tables and graphs. 13 ref. (P12, Co)

286-P. Perturbing-Center and Inherent Semiconduction of Intermetallic Compounds. (In German.) E. Justi and G. Lautz. *Zeitschrift für Naturforschung,* v. 7a, Feb. 1952, p. 191-200.

Effect of structure on the very high maxima of electrical resistance of Cd-Sb alloys. Purest stoichiometric CdSb was found to be a true semiconductor because the Brillouin zones are fully occupied by electrons. Study deals also with room-temperature resistance of perturbing-center semiconductors formed by adding other metals to CdSb. Special properties. Diagrams and graphs. 19 ref. (P15, Cd, Sb)

287-P. Superconductivity and Resistance of Tin With Lattice Distortions. (In German.) W. Buckel and R. Hilsch. *Zeitschrift für Physik,* v. 131, no. 3, 1952, p. 420-442.

Experiments on vapor-deposited layers of Su show a close correlation between superconductivity and lattice distortion. Diagrams, graphs, and tables. 15 ref. (P15, M26, Sn)

288-P. The Mechanism of Sulfur Pickup of Iron, Nickel, and Nickel Alloys at Elevated Temperatures. (In German.) K. Hauffe and A. Rahmel. *Zeitschrift für physikalische Chemie,* v. 199, Jan. 1952, p. 152-169.

Experiments made to determine rate as a function of temperature and pressure. Diagrams and graphs. 43 ref. (P12, N1, Fe, Ni)

289-P. Kinetics of Dissolution of Aluminum in Sodium Hydroxide. (In Italian.) G. P. Bolognesi. *Alluminio,* v. 21, Jan. 1952, p. 27-41.

Studied by measurement of H_2 generated, for 99.5 and 99.99% Al, in different concentrations of NaOH, and in presence and absence of Hg. Solution potentials as a function of Hg content were also determined. Tables and graphs. 41 ref. (P13, P15, Al)

290-P. The Magnetic Properties of Pyrrhotine (Magnetic Pyrite.) (In Russian.) S. V. Lipin. *Zapiski Vsesoiuznogo Mineralogicheskogo Oshchestva,* ser. 2, v. 80, Oct.-Dec. 1951, p. 258-268.

Influence of the ratio of S to Fe and of the degree of homogeneity in this iron ore. (P16, B14, Fe)

291-P. Influence of Cold-Work on the Hall Effect of a Metal. Bernard Wiener and Gerhart Groetzinger. *Journal of Applied Physics,* v. 23, Apr. 1952, p. 441-444.

A study on Cu to better understand the mechanism of cold work. Measurements made also on change of conductivity. Circuit diagram and tables. (P15, Q23, Cu)

292-P. The Isotope Effect in Superconductivity. II. Tin and Lead. B. Serin, C. A. Reynolds, and C. Lohman. *Physical Review,* ser. 2, v. 86, Apr. 15, 1952, p. 162-164.

Critical magnetic fields were measured as a function of temperature. For tin, critical temperature is related to average mass number and critical magnetic fields are proportional to critical temperatures. The isotope effect is shown to be present in Pb. (P15, Sn, Pb)

293-P. Superconductivity of the Isotopes of Tin. E. Maxwell. *Physical Review,* ser. 2, v. 86, Apr. 15, 1952, p. 235-242.

Superconducting transition temperatures of six samples of Sn with masses ranging from 113.58 to 123.01 were measured by a magnetic method. Critical field curves were determined between 1.4 and 3.8° K. Apparatus, graphs and tables. 27 ref. (P15, Sn)

294-P. New Technique for the Determination of Photonuclear Cross Sections. Lester L. Newkirk. *Physical Review,* ser. 2, v. 86, Apr. 15, 1952, p. 249-251.

Method applied to Cu and C. Induced radioactivity is employed to monitor the synchrotron beam. Graphs. (P10, Cu, C)

295-P. Isotropic Artificial Dielectric. R. W. Corkum. *Proceedings of the I.R.E.,* v. 40, May 1952, p. 574-587.

Isotropic artificial dielectric media composed of a 3-dimensional cubic array of metal or dielectric spheres were investigated. Theoretical expressions using the Clausius-Mossotti relation were derived for the index of refraction, dielectric constant, and magnetic permeability. Samples using steel and fused-quartz spheres were fabricated, and the dielectric properties measured in a rectangular wave-guide. (P15, ST)

296-P. Multi-Oscillator Processes in the Scattering of Neutrons by Crystals. G. L. Squires. *Proceedings of the Royal Society,* v. 212, ser. A, Apr. 22, 1952, p. 192-206.

A neutron velocity selector was used to investigate variation of scattering of slow neutrons with temperature of the scatterer. Results were obtained for Ni and Mg and compared with Weinstock's theory. Graphs. 12 ref. (P10, Ni, Mg)

297-P. Thermomagnetic Study of Metallic Praseodymium. (In French.) Charlotte Henry la Blanchetais. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Mar. 24, 1952, p. 1353-1354.

Within a very wide temperature range, metallic Pr follows the Curie-Weiss law. It has a moment very close to that of Pr^{+++} ion, and behaves, from this point of view, like Ce or Nd. Includes graph. (P16, Pr)

298-P. Some Electrical Properties of Industrial Colloidal Silver. (In French.) R. Bedos. *Journal de Chimie physique et de Physico-Chimie biologique,* v. 49, Mar. 1952, p. 93-98.

The behavior of a sol of silver subjected to an alternating field of variable frequency was studied by determining the variation of the complex impedence of a measuring cell containing the Ag sol. Charts and diagrams. (P15, Ag)

299-P. Experimental Study of Ferromagnetic Domains. (In French.) L. F. Bates. *Revue de Métallurgie,* v. 49, Mar. 1952, p. 185-194.

Study of "Bitter figures" — obtained by use of a colloidal powder placed on the surface of ferromagnetic metallic crystals. The surface is prepared by an electropolishing procedure. Apparatus is diagramed. Typical Bitter figures are explained for Si iron and for Co. Effect of inclusions. 14 ref. (P16, Fe, Co)

300-P. (Book) **Thermodynamics of Alloys.** John Lumsden. 384 pages. 1951. Institute of Metals, 4 Grosvenor Gardens, London S.W. 1, England.

Application of thermodynamics to the quantitative study of phase equilibria in metals and alloys. Emphasis is laid on the usefulness of ther-

modynamics for the accurate correlation of various equilibrium properties. The fundamental theory of the subject and some illustrative calculations on actual metals and alloys. Interpretation of thermodynamic parameters in terms of statistical mechanics. (P12, M24)

301-P. Thermal Conductivity Coefficients; New French Method of Determination in Metals. *Chemical Age,* v. 66, May 3, 1952, p. 695-696. (From paper by Edmond Rousseau, *Chimie et Industrie,* v. 67, No. 2, 1952, p. 242-248.)

Includes apparatus diagram for new calorimetric procedure. (P11)

302-P. Nickel Oxides; Relation Between Electrochemical Reactivity and Foreign Ion Content. Robert L. Tichenor. *Industrial and Engineering Chemistry,* v. 44, May 1952, p. 973-977.

Theoretical explanation of the electrochemical effects of adding Li, Bi, and Fe to the Ni electrode of alkaline storage batteries. Explains how these metals affect the electrode. (P15, R5, Ni)

303-P. The Heat Capacity and Entropy of Gold From 15 to 300° K. T. H. Geballe and W. F. Giauque. *Journal of American Chemical Society,* v. 74, May 5, 1952, p. 2368-2369.

Heat capacity at constant volume was calculated and compared with the Debye equation. Results, compared with those on several other face-centered-cubic metal crystals, show that the distribution of vibrational frequencies is characteristic of each metal. Entropy, heat content, and free energy are tabulated. (P12, Au)

304-P. The Mechanism of Hydrogen Evolution at Nickel Cathodes in Aqueous Solutions. J. O'M. Bockris and E. C. Potter. *Journal of Chemical Physics,* v. 20, Apr. 1952, p. 614-628.

Hydrogen overpotential at Ni cathodes was measured under very pure conditions. Observations were also made of buildup and rate of decay of overpotential and of capacity of the electrode-electrolyte interface. The most probable mechanism of hydrogen overpotential at Ni cathodes is that of a rate-determining discharge step followed by a recombination of hydrogen atoms. Apparatus diagrams, graphs, and tables. 30 ref. (P15, Ni)

305-P. The Heat Capacities of Uranium, Uranium Trioxide, and Uranium Dioxide From 15° K to 300° K. W. M. Jones, Joseph Gordon, and E. A. Long. *Journal of Chemical Physics,* v. 20, Apr. 1952, p. 695-699.

Data were obtained in 1942 by a calorimetric method. A maximum was observed at 28.7° K. in the heat capacity curve of UO_2, which is probably a result of the changing population of the magnetic quadrivalent uranium ions among their available energy states. Entropies and free energies of formation are given. Tables and graphs. 17 ref. (P12, U)

306-P. Recoil Atoms From Slow Neutron Capture by Gold and Indium Surfaces. Samuel Yosim and T. H. Davies. *Journal of Physical Chemistry,* v. 56, May 1952, p. 599-603.

Au and In recoil atoms were caught on an opposed collector. Yields of radioactive recoils were determined with and without electric fields and indicate recoil path lengths in the solid of no more than several lattice layers. Apparatus diagram, graphs, and tables. 18 ref. (P10, Au, In)

307-P. Oxide Film Formation on the Surface of Metallic Mercury in Aqueous Solutions and the Anomaly Between Its Potential and That of the Mercury-Mercuric Oxide Electrode. S. E. S. El Wakkad and T. M. Salem (Mrs. S. E. S. El Wakkad). *Journal of Physical Chemistry,* v. 56, May 1952, p. 621-625.

Studied by the anodic behavior of Hg utilizing both the cathode-ray-oscillograph method and the direct potentiometric method and by the effect of bubbling O_2 through the solution. Apparatus diagram and oscillograms. 11 ref. (P15, Hg)

308-P. Adsorption of Oxygen on Silver. F. H. Buttner, E. R. Funk, and H. Udin. *Journal of Physical Chemistry,* v. 56, May 1952, p. 657-660.

Results of determinations of the surface tension of solid Ag in pure He and in an atmosphere of controlled He-O_2 mixtures. Apparatus diagrams, graphs, and 10 ref. (P13, Ag)

309-P. Magnetic Domains on Silicon Iron by the Longitudinal Kerr Effect. C. A. Fowler, Jr., and E. M. Fryer. *Physical Review,* ser. 2, v. 86, May 1, 1952, p. 426.

Observations of Kerr effects were made by illuminating the surface with a small optical probe, passing the reflected beam through a nicol analyzer and measuring the intensity of the transmitted light with a sensitive multiplier phototube circuit. Results seem comparable with the magnetic powder patterns obtained by Williams, Bozorth, and Shockley. (P16, Fe)

310-P. Effect of Torsion on a Longitudinally-Magnetized Iron Wire. *Wireless Engineer,* v. 29, May 1952, p. 115-117.

Summarizes two communications recently received from W. V. Dromgoole of New Zealand. Results of experiments are summarized and practical applications are suggested in connection with torque measurement and transmission of data involving conversion of mechanical movements into electrical signals of varying amplitude and phase. Magnitude of the effect appears to be a function of permeability. Diagrams and graphs. (P16, Fe)

311-P. The Adsorption of Cations by Metals, Demonstrated by Use of Radioactive Tracers. (In French.) Julio Palacios and A. Baptista. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Apr. 21, 1952, p. 1676-1677.

Theoretical and experimental study based on the hypothesis that the potentials of electrodes are produced by adsorption of cations. Wires of Pt, Pd, Au, Ag, Cu, Pb, and Fe were immersed for definite periods in $Zn^{65}SO_4$, removed and washed, then studied with a Geiger counter to determine the amount of adsorption which took place. (P13, P15)

312-P. The Thermo-Electric Power of Very Thin Strips of Aluminum. (In French.) Jean Savornin and Georges Couchet. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Apr. 16, 1952, p. 1608-1610.

Thermo-electric power of Al-Cu couples formed between vacuum-deposited thin films of Al on sheet glass and pure Cu wires was determined between 0 and 300° C. as a function of film thickness. Tables and graphs. (P15, Al, Cu)

313-P. Electrochemical Equilibria. (In French.) M. Pourbaix. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Libreria Editrice Politecnica Cesare Taburini, Milan, Italy), 1951, p. 11-14; disc., p. 14.

A brief report on the thermodynamics of electrochemical reactions and electrochemical equilibrium diagrams, describing their use. 13 ref. (P15)

314-P. Potential-pH Diagram of Lead. Electrochemical Behavior and Corrosion of Lead. Lead Batteries. (In French.) P. Delahay, M. Pourbaix, and P. Van Rysselberghe. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Libreria Editrice Politecnica Cesare Taburini, Milan, Italy), 1951, p. 15-28.

The electrochemical equilibrium diagrams of the $Pb-H_2O$ system, and of the $Pb-CO_2-H_2O$ and $Pb-SO_4-H_2O$ systems are established as a function of pH and potential. These diagrams are applied to a study of the electrochemical behavior of Pb and its compounds; to the study of corrosion, passivation, and passivity of Pb; and to the study of lead cells. Diagrams and graphs. 11 ref. (P15, R1, Pb)

315-P. Potential-pH Diagram of Silver. Electrochemical Behavior and Corrosion of Silver. (In French.) P. Delahay, M. Pourbaix, and P. Van Rysselberghe. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Libreria Editrice Politecnica Cesare Taburini, Milan, Italy), 1951, p. 29-33.

The electrochemical equilibrium diagram of the $Ag-H_2O$ system was established as a function of the pH and the potential. This diagram was applied to a study of the electrochemical behavior of Ag and its compounds, and to a study of the corrosion of Ag. Diagrams. (P15, R1, Ag)

316-P. Potential-pH Diagram of Zinc. Electrochemical Behavior and Corrosion of Zinc. (In French.) P. Delahay, M. Pourbaix, and P. Van Rysselberghe. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Libreria Editrice Politecnica Cesare Taburini, Milan, Italy), 1951, p. 34-41.

The electrochemical equilibrium diagrams of the $Zn-H_2O$ and $Zn-CO_2-H_2O$ systems are established as a function of the pH and potential. They are applied to study of the electrochemical behavior of Zn and its compounds, and to the study of corrosion of Zn. Diagrams. (P15, R1, Zn)

317-P. Study of the Electrochemical Behavior of an Element Using Electrolysis Curves. (In French.) A. Juliard, C. Rorive-Boute, and D. Bermane. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Libreria Editrice Politecnica Cesare Taburini, Milan, Italy), 1951, p. 69-74; disc., p. 75-76.

Analysis of an electrolysis curve giving variation of intensity of the electrolysis current as a function of difference of voltage applied between an elctrode with a large surface, which is nonpolarizable, and a micro-electrode, dipped in a solution of a given element, making it possible to establish a series of

characteristic redox potentials which show electrochemical behavior of the element. With the aid of this technique, electrolysis curves were established from solutions of $Pb(NO_3)_2$, $AgNO_3$, and $FeSO_4$, with different pH's, in the absence or presence of different electrolytes. Includes charts. (P15)

318-P. Considerations on Electrochemical Kinetics. (In French.) R. Piontelli. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Libreria Editrice Politecnica Cesare Taburini, Milan, Italy), 1951, p. 79-104.

The processes of exchange of ions between metals and solutions of their simple salts; also laws which tie current density to electrode voltage. Schematic diagrams. 16 ref. (P15)

319-P. General Outline of Polarization Phenomena of Metals. (In French.) R. Piontelli and G. Poli. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Libreria Editrice Politecnica Cesare Taburini, Milan, Italy), 1951, p. 136-146; disc., p. 147-148.

Apparatus used by the authors and the results obtained, particularly on metals with normal electrochemical behavior. Graphs and schematic diagram. (P15, R1)

320-P. Ionic and Structural Properties and Electrochemical Behavior of Metals. (In French.) R. Piontelli. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Libreria Editrice Politecnica Cesare Taburini, Milan, Italy), 1951, p. 163-184; disc., p. 184.

Aspects of the electrochemical behavior of metals with respect to electrodes exchanging their ions with a solution. Includes table. 32 ref. (P15)

321-P. Influence of the Anion on the Electrochemical Behavior of Metals. (In French.) R. Piontelli. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Libreria Editrice Politecnica Cesare Taburini, Milan, Italy), 1951, p. 185-196; disc., p. 196-197.

Results of a systematic study of the above for both the anode and the cathode. Tabular data. 27 ref. (P15)

322-P. Further Investigations on Evans Cells. (In German.) Kurt Wickert and Hartmut Wiehr. *Werkstoffe und Korrosion,* v. 3, Apr. 1952, p. 129-142.

Presents results of comprehensive investigation of Evans cells (N_2/Fe/-NaCl—Fe/O_2). Effects of mechanical and chemical surface preparation and other factors on cathode deterioration. Numerous other relationships were also investigated. Graphs and tables. (P15, Fe)

323-P. The Influence of Inhibitors Upon Electrochemical Processes on Metallic Surfaces. (In German.) H. Fischer. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Libreria Editrice Politecnica Cesare Taburini, Milan, Italy), 1951, p. 105-115; disc., p. 115.

Inhibition of electrode surfaces, and its various consequences such as polarization, negative catalysis of resulting reactions, reduction and oxidation of inhibitors, and modification of the crystallization process. The specific susceptibility of the metal atoms to inhibitors, and its variation in the submicroscopic realm of the crystals. Tables and graphs. 11 ref. (P15, R10, L17)

324-P. The Influence of Aging Factors on the Emissivity of Reflective Insulations. F. C. Hooper and W. J. Moroz. *ASTM Bulletin,* May 1952, p. 92-95.

Includes foreword by E. A. Allcut and a study of the above on metal foil subjected to such conditions as atmospheric exposure and spraying with dilute chemical solutions. Tables and graph. (P17)

325-P. Thermal Conductivity Coefficients; New French Method of Determination in Metals. *Chemical Age,* v. 66, May 3, 1952, p. 695-696. (From paper by Edmond Rousseau, *Chimie et Industrie,* v. 67, no. 2, 1952, p. 242-248.)

Includes apparatus diagram for new calorimetric procedure. (P11)

326-P. Dynamic Hysteresis Loop Measuring Equipment. H. W. Lord. *Electrical Engineering,* v. 71, June 1952, p. 518-521.

Test circuit for magnetic materials. Sources of error and means of compensating for them in the hysteresis loop displayed on the oscilloscope of the test unit. Block diagram and oscillograms. (P16)

327-P. The Magnetic Structure of Alnico 5. E. A. Nesbitt and R. D. Heidenreich. *Electrical Engineering,* v. 71, June 1952, p. 530-534.

The mechanism which enables the alloy to respond to heat treatment in a magnetic field. (This treatment produces a 3-fold increase in the figure of merit.) Experimental work was guided by theory of Kittel, Nes-

bitt, and Shockley. Graphs and electron micrographs. 11 ref.
(P16, Fe, SG-n)

328-P. Magnetic Core Materials for Small Power Transformers. Arthur V. Hughes and Charles F. Salt. *Electrical Manufacturing,* v. 49, June 1952, p. 133-138, 324, 326, 328, 330, 332, 334, 336.

A study of various materials and configurations in relation to optimum transformer design. Effects of lamination thickness, joints, core clamps, temperatures, and frequency of operation on performance. Tables and graphs. (P16, SG)

329-P. Activity of Sulphur in Liquid Iron and Steel. Charles W. Sherman and John Chipman. *Journal of Metals,* v. 4, June, 1952: *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 597-602.

The chemical behavior of sulfur in liquid iron at 1600° C. was investigated through study of the equilibrium of the reaction: $H_2 + S = H_2S$. From the known equilibrium constant of the reaction and the experiment data, activity of sulfur in the melt was determined. Effects on activity coefficient of P, C, Al, Si, Cu, and Mn were determined. A semi-empirical method was devised for calculating activity coefficient of sulfur in complex solutions of four or more components and tested against extensive data on solutions of this kind. 12 ref.
(P12, Fe, ST)

330-P. Solid Solubility of Sulphur in Iron. Terkel Rosenqvist and Boleslaw L. Dunicz. *Journal of Metals,* v. 4, June, 1952: *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 604-608.

The work was based on measurement of chemical activity of sulfur in the solid solution by means of equilibrium with a mixture of H_2 and H_2S. When the solid-solubility limit is reached, the S activity in the Fe becomes equal to that in the co-existing sulfide phase. Apparatus and procedure. Data are charted and tabulated. Phase diagram for the low-S region of the Fe-S system. 10 ref. (P12, Fe)

331-P. Melting Point and Transformation of Pure Chromium. D. S. Bloom. J. W. Putman, and N. J. Grant. *Journal of Metals,* v. 4, June, 1952: *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 626.

Because of wide variations in recent melting-point determinations, a new study was made using very pure Cr. Result of 1903° C. for melting point is believed to be accurate to ±10° C. Temperatures of the $\alpha \rightarrow \beta$ and reverse transformations were also determined.
(P12, Cr)

332-P. Optical Temperature Scale and Emissivities of Liquid Iron-Copper-Nickel Alloys. David B. Smith and John Chipman. *Journal of Metals,* v. 4, June, 1952: *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 643-644.

Range of measurements on Cu-free metals was extended from the melting point to 1600° C. For Cu, the upper limit was 1380° C, and the data were extrapolated linearly for comparison with observations on the other metals and alloys at 1535° C. (P17, Fe, Cu, Ni)

333-P. Thermal Expansion of Aluminum and Some Aluminum Alloys. Peter Hidnert and H. S. Krider. *Journal of Research of the National Bureau of Standards,* v. 48, Mar. 1952, p. 209-220.

A study of thermal expansion for various temperature ranges between −50 and +400° C. by the fused-quartz tube and dial-indicator, and by precision micrometric methods. Ternary diagrams are given for effects of composition on expansion of Al-Cu-Ni and Al-Si-Cu alloys. Tables and graphs. 16 ref. (P11, Al)

334-P. Temperature Variation of the Magnetostriction of "Alcomax". M. McCaig. *Nature,* v. 169, May 24, 1952, p. 889-890.

Graph for preliminary results on Alcomax and some related alloys in reference to magnetic anisotropy. (P16)

335-P. Thermal Conductivity in the Intermediate State of Pure Superconductors. D. P. Detwiler and Henry A. Fairbank. *Physical Review,* ser. 2, v. 86, May 15, 1952, p. 574.

Measurements of thermal conductivity of Johnson-Matthey spectroscopically pure Sn and In as a function of transverse magnetic field strength suggest that the thermal-conductivity minimum and hysteresis effects in the intermediate state may be characteristic of all pure superconductors. (P11, P16, Sn, In)

336-P. Discontinuities in the Variation of Magnetization With Temperature. V. L. Newhouse. *Proceedings of the Physical Society,* v. 65, sec. A, May 1, 1952, p. 325-328.

Demonstrates that magnetic discontinuities accompany changes of temperature at constant field. The effect was investigated for hard drawn Fe and Ni and is accounted for in terms of two mechanisms, one associated with decrease of co-

ercivity with rise of temperature and the other with disperse field due to thermal oscillations of the carriers of magnetic moment
(P16, Fe, Ni)

337-P. Method for the Determination of Hysteresis Loop Area. W. B. Conover. *Transactions of the American Institute of Electrical Engineers,* v. 70, pt. 2, 1951, p. 1485-1486.

Method is somewhat less accurate than conventional methods, but more rapid and convenient, and requires no special equipment. It can be applied directly to loops on the screen of a cathode-ray oscilloscope without photography or manual tracing. Illustrated by a typical hysteresis loop for magnetic sheet steel. (P16)

338-P. Adsorption and the Hydrogen Overpotential. P. J. Hillson. *Transactions of the Faraday Society,* v. 48, May 1952, p. 462-473.

Hydrogen overpotential and capacity of the working electrode were measured on electrodes of Hg, Ni, W, Ta, Au, and Ag in the presence of n-hexyl alcohol, n-caproic acid, n-hexylamine hydrochloride and p-toluene sulfonic acid. Differential effects of these capillary-active substances. Calculates hydrogen overpotential of various metals from literature data. Apparatus diagram, tables, and graphs. 17 ref.
(P15, Hg, Ni, W, Ta, Au, Ag)

339-P. Electrical Conductivity of Thin Platinum Coatings on Dielectric Bases, Deposited in Vacuum. (In French.) Charles Feldman. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, May 5, 1952, p. 1858-1860.

The conductivity of platinum deposits on KBr, CaF_2, and SiO_2 was investigated. Differences in their conductivity, and interpretation of the results. (P15, Pt)

340-P. Study of a Ferronickel at a Very Low Voltage in Static and Alternating Fields. (In French.) Israel Epelboin and Guy Gilardin. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, May 5, 1952, p. 1860-1862.

Two methods for the study of magnetization in static and alternating fields, applied to test pieces of closed magnetic current, for the purpose of comparing mumetal strips of high permeability. Proposes an explanation of the magnetic properties.
(P16, Fe, Ni, SG-n, p)

341-P. Capture of Negative μ Mesons in Copper and Tin. (In French.) André Lagarrigue and Charles Peyrou. *Comptes Rendus hebdomadaires des séances de l'Académie des Sciences,* v. 234, May 5, 1952, p. 1873-1875.

The probability of electron emission by the negative μ mesons caught by Cu and Sn lattices. The study was in a Wilson chamber with a magnetic field. Results are interpreted. (P10, Cu, Sn)

342-P. Measuring Cathodic Oxygen Reduction by Means of Suitable Model Elements. (In German.) F. Tödt. *Zeitschrift für Elektrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Mar. 1952, p. 165-169.

Reduction of oxides on Au as well as on Pt can be studied by measuring capacitance and galvanic current generated by action of oxygen, even though the layer be less than mono-atomic in average thickness. Tables and graphs. 11 ref. (P15)

343-P. Polarization Capacitance, Adsorption, and Overvoltage of Hydrogen on Platinum. (In German.) E. Wicke and B. Weblus. *Zeitschrift für Elektrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Mar. 1952, p. 169-176.

Mechanism of hydrogen exchange between electrode and electrolyte and of hydrogen overvoltage depends mainly on degree of coating of electrode with adsorbed hydrogen. Effect of electrolyte composition on polarization capacitance and, thus, hydrogen adsorption was investigated, results indicating that overvoltage is a result of slow discharge of hydrogen ions at the surface of the Pt electrode. Data are charted. (P15, Pt)

344-P. Activities in the Molten Ternary Na-Pb-Hg System. (In German.) F. Halla and R. Herdy. *Zeitschrift für Elektrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Mar. 1952, p. 213-218.

Measurements of emf.'s and of vapor pressures were made to determine reactivities, heats of mixing, and affinities. Graphs and tables. (P12, Na, Pb, H)

345-P. Internal Friction of Molten Silver-Copper-Gold Alloys. (In German.) Erich Gebhardt and Georg Wörwag. *Zeitschrift für Metallkunde,* v. 43, Apr. 1952, p. 106-108.

Results of internal friction measurement show that viscosity of these ternary alloys increases with declining temperature and increasing Au content. Tables and graphs. (P10, Q22, Ag, Cu, Au)

346-P. Mechanism of "Explosion" of Wires. (In German.) Bruno Eiselt. *Zeitschrift für Physik,* v. 132, No. 1, 1952, p. 54-71.

When a highly charged condenser

is discharged through a thin wire, the wire often vaporizes suddenly in a manner resembling an explosion. This phenomenon was investigated, using optical, motion-picture, electrical, and oscillographic techniques. Methods and equipment; typical results on Cu and Fe wires. 18 ref. (P15, Cu, Fe)

347-P. Influence of Carbon on Interfacial Tension of Iron at the Slag-Metal Boundary. (In Russian.) S. I. Popel, O. A. Esin, and Iu. P. Nikitin. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Mar. 11, 1952, p. 253-255.

A study was made of the surface tension of molten Fe when exposed to slag instead of gaseous media. Data are charted. (P10, Fe)

348-P. The Atomistic Theory of Metallic Surfaces. Conyers Herring. *American Society for Metals,* "Metal Interfaces", 1952, p. 1-19; disc., p. 19.

A qualitative exposition. Diagrams. 12 ref. (P10)

349-P. Theory of Internal Boundaries. Harvey Brooks. *American Society for Metals,* "Metal Interfaces", 1952, p. 20-64; disc., p. 64.

Concerned mainly with interfaces between crystalline solids. Types of internal boundaries; requirements for a theory of internal boundaries; general properties of internal surfaces; models of grain boundaries; and interphase boundaries. Includes mathematical appendices. 40 ref. (P10, M27)

350-P. Measurement of Solid:Gas and Solid: Liquid Interfacial Energies. Harry Udin. *American Society for Metals,* "Metal Interfaces", 1952, p. 114-133.

Surveys recent work (since 1945), at least four groups of workers. Typical results are charted and discussed. 26 ref. (P10)

351-P. Measurement of Solid: Solid Interfacial Energies. James B. Hess. *American Society for Metals,* "Metal Interfaces", 1952, p. 134-150; disc., p. 150-152.

Basic concepts and various measurement procedures. The best scheme at the present time is said to be the one of microscopically measuring the dihedral angles between intersecting interfaces at equilibrium. 37 ref. (P10)

352-P. Energies and Structure of Grain Boundaries. K. T. Aust and B. Chalmers. *American Society for Metals,* "Metal Interfaces", 1952, p. 153-178.

The two theories which attempted to explain the structure of the grain boundary, namely the amorphous cement and the transitional-lattice theories, are considered in the light of experimental evidence. Properties of grain boundaries, such as melting, mechanical and viscous behavior, and chemical effects, indicate the transitional-lattice theory to be the more suitable one. Recent measurements of an intrinsic property of the boundary, namely its surface free energy, have shown that the boundary energies for Sn, Pb, silicon ferrite, and Ag are dependent upon difference of orientation of the grains on either side of the boundary. This is regarded as incontrovertible evidence that different boundaries differ in structure and cannot, therefore, be amorphous. Other theories and experimental approaches. 85 ref. (P10, M27)

353-P. Stress Relaxation Across Interfaces. A. S. Nowick. *American Society for Metals,* "Metal Interfaces", 1952, p. 248-268.

Studied by application of torsional stresses to wires a wide variety of anelastic phenomena that occur in materials containing internal interfaces may be explained by the simple assumption that an interface is unable to maintain permanently a shearing stress across it. The detailed behavior of a material depends on how the interfaces within it are distributed. Both Kes and Mott's theories of activation energy for interface relaxation seem to be inconsistent with new data presented. A tentative mechanism consistent with present experimental data, is that relaxation occurs by transfer of atoms from one edge dislocation to another. 28 ref. (P10, Q22)

354-P. Mechanical Effects of Interfaces. Bruce Chalmers. *American Society for Metals,* "Metal Interfaces", 1952, p. 299-311.

The various types of interfaces occurring in and around metals: external, and intracrystalline between the same and differing phases. Their effects on mechanical properties. 33 ref. (P10, Q general)

355-P. Metal Surface Phenomena. Herbert H. Uhlig. *American Society for Metals,* "Metal Interfaces", 1952, p. 312-335.

A fundamental discussion of physical and chemical forces acting at the surface of metals. Adsorption on metals; physical adsorption and chemisorption; chemisorption of oxygen on tungsten; passivity; adsorption and lubrication; adsorption of metals on metals; and factors affecting chemisorption. Diagrams and graphs show illustrative data for various metals. 38 ref. (P10, P13)

356-P. Eddy-Currents in Solid Cylindrical Cores Having Non-Uniform Permeability. Harold Aspden. *Journal of Applied Physics,* v. 23, May 1952, p. 523-528.

Mathematical presentation of a method of estimating magnetization losses due to eddy currents in solid cylindrical cores of ferromagnetic material. The conception of complex permeability is introduced to show the effects which hysteresis has upon degree of flux penetration. (P16, Fe)

357-P. Magnetically Induced Ultrasonic Velocity Changes in Polycrystalline Nickel. S. J. Johnson and T. F. Rogers. *Journal of Applied Physics,* v. 23, May 1952, p. 574-577.

Shear and compressional ultrasonic propagation modes are used throughout the range of 1-10 mc. The polycrystalline measurements are compared to recently published single Ni crystal values. 16 ref. (P10, Ni)

358-P. Heat Conduction in Alloys at Low Temperatures. I. Estermann and J. E. Zimmerman. *Journal of Applied Physics,* v. 23, May 1952, p. 578-588.

Method by which the thermal conductivity of relatively small samples (⅛-¼ in. diameter, 1-2 in. long) of various materials can be measured in the temperature regions obtainable with liquid N_2, H_2, and He. Preliminary measurements on several commercial alloys (Monel, Inconel, and stainless steel) were made. Tables and graphs. 16 ref. (P11, Ni, SS)

359-P. Electrodeposition Behavior of a Simple Ion. II. Precipitation Into a Liquid Electrode (Mercury). L. B. Rogers. *Journal of the Electrochemical Society,* v. 99, June 1952, p. 267-271.

Distribution of a trace of an element between an aqueous solution of its salt and a mercury cathode is considered to be a special example of solvent extraction in which distribution is a function not only of the volume of the liquids but also of the cathode potential. Method of improving separations by adjusting the ratio of the volumes of mercury and aqueous solution before electrolysis. 14 ref. (P15)

360-P. Electro-Organic Chemistry. H. Jermain Creighton. *Journal of the Electrochemical Society,* v. 99, June 1952, p. 127C-130C.

Historical review of progress. Various classic investigations; also means for extending scope of this field. 46 ref. (P15, A2)

361-P. Effect of the Blocking Layer on the Tarnishing Process at the Metal-Selenium Boundary. (In German.) Siegfried Poganski. *Zeitschrift für Elektrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 45, Mar. 1952, p. 193-198.

Cd and Se in close contact, which have a marked blocking effect, were used to investigate the expected effect of the blocking layer at the boundary between a metal and certain metalloids on the rate of tarnishing of this layer at different temperatures. Diagrams and graphs. 14 ref. (P15, R2, Cd, Se)

362-P. (Book) **Metal Interfaces.** 348 pages. 1952. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $5.00.

A series of papers presented at 33rd National Metal Congress and Exposition, Detroit, Oct. 13-19, 1951. Individual papers are separately abstracted. (P10, N general)

363-P. (Book) **Modern Magnetism.** Ed. 3. L. F. Bates. 506 pages. 1951. Cambridge University Press, London, England.

Attempts to explain modern magnetic theory not only for students of physics, but for more general readers. Accounts of experimental work, particularly foreign, are included; not only for their contribution to magnetic theory, but for their importance in industrial applications. Includes information on specific metallic and nonmetallic magnetic materials. Footnote references. (P16)

364-P. (Book) **Comite International de Thermodynamizue et de Cinetique Electrochimiques.** (International Committee on Electrochemical Thermodynamics and Kinetics.) Proceedings of the 2nd meeting, 1950, 407 pages. 1951. Libreria Editrice Politecnica Cesare Tamburini, Milan, Italy.

Papers and discussions given at above meeting. Electrochemical equilibria, electrochemical kinetics, application to the study of corrosion, application to the study of general chemistry and analytical chemistry, polarography, and electrochemical nomenclature and definitions. Selected papers are abstracted separately. (P15, P13, R1, L17, S11)

365-P. (Book) **Nagrev Metalla; Teoriia i Metody Rascheta.** (Heating of Metals; Theory and Methods of Calculation.) G. P. Ivantsov. 191 pages. 1948. Government Scientific-Technical Publishing House for Literature on Ferrous and Nonferrous Metallurgy, Sverdlovsk and Moscow, U.S.S.R.

Mathematical bases of the theory of heating metals in furnaces under

different conditions of heat exchange. Original and classical methods for calculating time of heating. Formulas, tables, and graphs; numerical examples. (P12)

366-P. The Anisotropy of Electrical Resistivity of Cold-Drawn Wires of Some Cubic Metals and Alloys. T. Broom and W. K. Clothier. *Australian Journal of Scientific Research,* ser. A, v. 5, Mar. 1952, p. 119-127.

A special a.c. technique was devised to measure and compare the transverse resistivities of wires. In drawn wires of several metals and alloys, resistivities measured in the longitudinal and transverse directions are shown to differ. In Cu, longitudinal resistivity was slightly less than transverse, but in α-brass and α-Al bronze it was greater by about 3%. Suggests that an explanation may be found in terms of lattice disturbances associated with dislocations. (P15, Cu)

367-P. On the Anisotropy of Electrical Resistivity of Deformed Cubic Metals and Alloys. T. Broom. *Australian Journal of Scientific Research,* ser. A, v. 5, Mar. 1952, p. 128-134.

Change of resistivity on annealing cold rolled metals was found to depend on direction of measurement for Cu-Ni, steel, α-brass, and sterling silver, while no such variation was observed for Al, Cu, or Ni. An explanation of anisotropy both in strip and in wire is advanced in terms of lattice disturbances such as dislocations, vacant sites, and faults. Influence of deformation, recovery, and a second phase on anisotropy developed in brasses. 11 ref. (P15, Cu, Ni, ST, Ag)

368-P. A High Permeability Nickel Iron Alloy. *Engineer,* v. 193, June 6, 1952, p. 775.

Physical properties of a new British alloy, "Permalloy F," which has a markedly rectangular hysteresis loop and a low value of coercive force, and is suitable as a core material for all forms of saturable reactors. (P16, Ni, Fe, SG-n, p)

369-P. Magnetic Nickel-Iron Alloy. *Engineering,* v. 173, May 30, 1952, p. 691.

See abstract from *Engineer;* item 368-P, 1952, above.
(P16, Fe, Ni, SG-n, p)

370-P. Interaction of Phosphorus-32 Beta Rays With Matter. Gordon L. Brownell. *Nucleonics,* v. 10, June 1952, p. 30-35.

Energy distribution of β-rays from a thin P^{32} source mounted on collodion film was measured before and after addition of various metallic absorbers and backscatterers. Angular distribution was also determined. Graphs. 16 ref.
(P13, Pt, Al, Cu, Sn)

371-P. The High Frequency Resistance of Metals in the Normal and Superconducting State. C. J. Grebenkemper and John P. Hagen. *Physical Review,* ser. 2, v. 86, June 1, 1952, p. 673-679.

Resistance of Pb, In, and Sn was measured at frequencies of 9000 mc. per sec. using resonant-cavity techniques. Preliminary measurements on Sn at 24,000 mc. per sec. also were made. Experimental techniques and measurement procedure.
(P15, Pb, In, Sn)

372-P. Nuclear Magnetic Resonance of Hydrogen Absorbed Into Palladium Wires. R. E. Norberg. *Physical Review,* ser. 2, v. 86, June 1, 1952, p. 745-752.

Details of experiment. Graphs.
(P16, Pd)

373-P. Scattering of Electrons in Metals by Dislocations. D. L. Dexter. *Physical Review,* ser. 2, v. 86, June 1, 1952, p. 770-774.

The problem of the change in electrical conductivity in metals upon cold working is treated by the method of Koehler in which the scattering of electrons by pairs of parallel edge-type dislocations is assumed to be the major effect. A comparison is made between the electronic shielding used by Koehler and the shielding assumed by Landauer. The scattering matrix element is also evaluated, and anisotropy in the resistivity is discussed. (P15)

374-P. Low Temperature Thermal Expansion of Uranium. Adam F. Schuch and Henry L. Lacquer. *Physical Review,* ser. 2, v. 86, June 1, 1952, p. 803.

A study of the elastic constants of U. Graph. (P11, U)

375-P. The Thermal Conductivity of Metals at Low Temperatures. I. The Elements of Groups 1, 2 and 3. II. The Transition Elements. K. Mendelssohn and H. M. Rosenberg. *Proceedings of the Physical Society,* v. 65, sec. A, June 1, 1952, p. 385-394.

Part I: Thermal conductivities of Cu, Ag, Au, Mg, Cd, Al, In and one polycrystalline and two single-crystal specimens of Zn were measured in the range 2-40° K. Part II: Thermal conductivity in the same range was measured for Ti, Mn, Fe, Ni, Zr, Cb, Mo, Rh, Pd, Ta, W, Ir, Pt, U, and for a Pb single crystal. As a rule, the metals of group 8 exhibited much higher conductivity than the metals of the lower groups. Numerous graphs. 10 ref. (P11)

376-P. The Range-Energy Relation for Protons in Aluminium. D. H. Simmons. *Proceedings of the Physical Society,* v. 65, sec. A, June 1, 1952, p. 454-456.

Nuclear emissions were used to measure the energy loss of initially 10 Mev. protons in traversing a thickness of Al which reduces their energy to about 3 Mev. Tables. (P10, Al)

377-P. Ferromagnetic Resonance in Manganese Antimonide. G. D. Adam and K. J. Standley. *Proceedings of the Physical Society,* v. 65, sec. B, June 1, 1952, p. 454-455.

Ferromagnetic resonance absorption was studied in powdered specimens of MnSb at a wave length of 1.26 cm. and in the range 20° C. to the Curie point (315° C.). (P16, Mn, Sb)

378-P. Low Remanence and the Temperature Variation of Permeability of Silicon-Iron Alloys. E. W. Lee. *Proceedings of the Physical Society,* v. 65, sec. B, June 1, 1952, p. 455-456.

Observations suggest that the above properties of Si-Fe are closely connected and that both can be explained in terms of internal flux closure. Discusses measurements on alloys containing 0.9-14.0% Si. (P16, Fe)

379-P. The Influence of Heat Treatment on Magnetic Viscosity in Permanent Magnet Alloys. R. Street, J. C. Woolley, and P. B. Smith. *Proceedings of the Physical Society,* v. 65, sec. B, June 1, 1952, p. 461-462.

Briefly discusses literature. Graph shows results of measurements on Alnico specimens subjected to two different types of heat treatment. (P16, J general, SG-n)

380-P. Permeameter for Elevated Temperature Tests. Robert H. Esling. *Review of Scientific Instruments,* v. 23, May 1952, p. 247-248.

Design and electrical circuit of an apparatus for magnetic permeability testing. Three specimens of Type 416 stainless steel were prepared and tested—first at room temperature (80° F.), then at 450° F. (P16, SS)

381-P. Catalytic Effect of Several Metals on the Oxidation of Lubricating Oils. D. W. Sawyer. *Transactions of the American Society of Mechanical Engineers,* v. 74, Jan. 1952, p. 113-119; disc., p. 119-122.

Considerable evidence has accumulated to show that Al is especially well adapted for construction of many types of equipment for handling lubricating oils such as sumps, coolers, pistons, pumps, crankcases, and tubing. Compares the effects of various metals and alloys on properties of lubricating oils at several temperatures. It appears that Al alloys and stainless steel have only a very slight or no catalytic effect on oxidation of mineral oils and are more resistant than many of the other metals evaluated. Copper and low-carbon steel were found definitely to have an adverse effect upon properties of the oils. (P13, Al, SS, Cu, CN)

382-P. Electrical Potential Differences and Their Origin. J. A. V. Butler. "Electrical Phenomena at Interfaces" (Macmillan Co., New York), 1951. p. 1-29.

A fundamental discussion, with extensive references to the literature. Includes section on electrode potentials of metals. 30 ref. (P15)

383-P. Overpotential. J. O'M. Bockris. "Electrical Phenomena at Interfaces" (Macmillan Co., New York), 1951. p. 155-189.

A fundamental discussion. 142 ref. (P15)

384-P. Concentration Polarization and the Deposition of Metals. J. A. V. Butler. "Electrical Phenomena at Interfaces" (Macmillan Co., New York), 1951, p. 190-203.

A fundamental discussion. 52 ref. (P15, L17)

385-P. The Behaviour of Oxygen and Hydrogen at Electrodes. J. A. V. Butler. "Electrical Phenomena at Interfaces" (Macmillan Co., New York), 1951, p. 204-228.

A fundamental discussion. Adsorption of oxygen at anodes, electrolytic behavior of hydrogen, and formation of oxide films on noble metals. 138 ref. (P15, R1)

386-P. Progress in Metallurgy. B. A. Rogers and F. H. Spedding. "Annual Review of Nuclear Science." Vol. I. (Annual Reviews, Stanford, Calif.), p. 441-464.

Reviews effect of nuclear irradiation on properties of metals, new measurements on physical properties of thorium and uranium, data on alloys and compounds of thorium and uranium, application of radioisotopes to metallurgical investigations, newly published information on three metals of interest in reactor design, reports on liquid metals that may be usable in heat exchangers. 66 ref. (P general, S19, Th, U)

387-P. (German.) **Fine-Wire Resistors for Measuring and Control Purposes. Computations and Applications.** Otto Schultze. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, June 1, 1952, p. 473-480.

Method of computing size of wire of given alloys for specific resistors. Some new uses of fine-wire resistors. Illustrations and graphs. (P15)

388-P. (German.) **Magnetic Measurements on Iron Amalgam to Determine Its Ferromagnetic Properties and Grain Size.** Armin Mayer and Eckhart Vogt. *Zeitschrift für Naturforschung,* v. 7a, May 1952, p. 334-340.

Experimental studies on the effect of aging on magnetic properties confirm earlier reports that iron below a certain grain size (30A.) is paramagnetic. Data are charted. 16 ref. (P16, Fe)

389-P. (German.) **Radiation From Freshly Vapor-Deposited Layers of Metals and Salts.** H. Gobrecht and G. Barsch. *Zeitschrift für Physik,* v. 132, No. 2, 1952, p. 129-139.

Experiments made with vapor-deposited Sb, Ag, Al, and Fe, also KCl, NaCl, and K_2SO_4, to investigate the cause of electron emission. Results indicate that oxidation and surface adsorption are the causes of radiation; and that edges, scratches, variations in layer thickness, undercoating, and centers of metal formation influence rate of reaction.
(P10, L25, Sb, Ag, Al, Fe)

390-P. (German.) **New Contributions to the Problem of Magnetic Transformation.** Friedrich Fraunberger. *Zeitschrift für Physik,* v. 132, No. 2, 1952, p. 212-220.

Shows that magnetic transformation occurs in several steps. Relationship between magnetic state and characteristic temperature. Graphs. 16 ref. (P16)

391-P. (Russian.) **Investigation of the Hysteresis Loop of Deformed Nickel at Low Temperatures.** M. A. Grabovskii. "Uchenye Zapiski. Vypusk 134. Fizika. Kniga Piataia" (Scientific Records. Vol. 134. Physics, Vol. 5), Lomonsov's Moscow State University, 1949. p. 31-55.

Ni was deformed by tension, torsion, and bending. Magnetic properties were determined with respect to extent of deformation and to testing temperature. Test data are charted. 35 ref. (P16, Ni)

392-P. (Russian.) **The Equivalent Action of a Circular Magnetic Field and the Drawing Load on the Longitudinal Magnetization of Nickel Wire.** M. A. Grabovskii and G. M. Liakhov. "Uchenye Zapiski. Vypusk 134. Fizika. Kniga Piataia" (Scientific Records. Vol. 134. Physics, Vol. 5), Lomonsov's Moscow State University, 1949, p. 56-62.

A study was made of the magnetic anisotropy of Ni wire and its causes. The interrelationship of natural magnetic anisotropy and of anisotropy induced by external forces was determined. Data are charted. 20 ref. (P16, Ni)

393-P. (Russian.) **Investigation of Certain Rapid Processes in Iron During an Aperiodic Change of the Field.** R. V. Telesnin. "Uchenye Zapiski. Vypusk 134. Fizika. Kniga Piataia" (Scientific Records. Vol. 134. Physics. Vol. 5), Lomonsov's Moscow State University, 1949, p. 63-92.

A study was made of the rate of magnetization and of demagnetization of iron in toroids, wires, and foils. Hysteresis loops for various conditions. 26 ref. (P16, Fe)

394-P. (Russian.) **Eddy Currents in Non-Magnetic, Metallic Cylinders and Plates.** R. V. Telesnin. "Uchenye Zapiski. Vypusk 134. Fizika. Kniga Piataia" (Scientific Records Vol. 134. Physics. Vol. 5), Lomonsov's Moscow State University, 1949, p. 93-99.

A theoretical discussion. Results of experiments on Cu, Al, brass, and Zn specimens. (P16, Cu, Al, Zn)

395-P. (Russian.) **Investigation of the Heat Capacity of Low Melting Metals in the Solid and Liquid States.** G. M. Bartenev. "Uchenye Zapiski. Vypusk 134. Fizika. Kniga Piataia" (Scientific Records. Vol. 134. Physics. Vol. 5), Lomonsov's Moscow State University, 1949, p. 113-125.

An experimental study for Sn and Pb of high purity. Data are tabulated and charted. 37 ref. (P12, Sn, Pb)

396-P. (Russian.) **Heat Capacity of Tin and Lead Alloys.** G. M. Bartenev. "Uchenye Zapiski. Vypusk 134. Fizika. Kniga Piataia" (Scientific Records. Vol. 134. Physics. Vol. 5), Lomonsov's Moscow State University, 1949, p. 126-133.

Three Pb-Sn alloys were investigated; 38% Pb, 62% Sn; 72.4% Pb, 27.6% Sn; and 89.9% Pb, 10.1% Sn. Data are charted. (P12, Pb, Sn)

397-P. The Heat Capacity of Nickel From 15 to 300° K.; Entropy and Free Energy Functions. R. H. Busey and W. F. Giauque. *Journal of the American Chemical Society,* v. 74, June 20, 1952, p. 3157-3158.
(P12, Ni)

398-P. Specific Heat of Germanium Between 20° K. and 200° K. I. Estermann and J. R. Weertman. *Journal of Chemical Physics,* v. 20, June 1952, p. 972-976.

High-precision measurements were carried out between 20 and 200° K. Three samples of Ge were investi-

gated: an extremely pure sample, one of intermediate purity, and one with an addition of 0.006 at. % Al. Graphs and tables. (P12, Ge)

399-P. Influence of the Impurities in the Foil, Electrolyte and Paper in the Electrolytic Capacitor. Gaston Muriset. *Journal of the Electrochemical Society,* v. 99, July 1952, p. 285-288.

Effect on the leakage current. Anode material considered is Al of different purities. Graphs. 12 ref. (P15, T1, Al)

400-P. Production of Nickel Carbide by Decomposition of n-Hexane on Metallic Nickel. A. Cimino and G. Parravano. *Journal of Physical Chemistry,* v. 56, June 1952, p. 706-707.

Additional data on the formation and properties of low-temperature metal carbides. Graphs and tables. (P13, Ni, C-n)

401-P. Sorption of Gases on Metal Powders and Subsequent Change in Metal Reactivity at Room Temperature. Hung Li Wang and Norman Hackerman. *Journal of Physical Chemistry,* v. 56, June 1952, p. 771-774.

The amounts of Cl_2, NO_2, O_2 and CO taken up by powders of stainless steel, Ni, and Mo were measured at room temperature. Reactivities of metal powders, in terms of H_2 evolution in dilute-acid solutions in the absence of air, were determined for reduced stainless steel, Ni and Cr powders when they were bare, with CO adsorbed, or when covered with sorbed oxygen. Graphs and tables. (P13, SS, Ni, Mo, Cr)

402-P. Inelastic Scattering of Protons From Nickel. Ralph Ely, Jr., A. J. Allen, J. S. Arthur, R. S. Bender, H. J. Hausman, and E. M. Reilley. *Physical Review,* ser. 2, v. 86, June 15, 1952, p. 859-860.

Energy levels in Ni were observed at 90°. 20 levels are reported. Energy spectra and tables. (P10, Ni)

403-P. Magnetostrictive Vibration of Prolate Spheroids. Ni-Fe and Ni-Cu Alloys. J. S. Kouvelitest and L. W. McKeehan. *Physical Review,* ser. 2, v. 86, June 15, 1952, p. 898-904.

A study of different magnetic properties determined from the magnetostrictive vibrational behavior of small ferromagnetic prolate spheroids was extended to a large number of Ni-Fe (88, 84, 79, 68, 56, and 45 at. % Ni) and Ni-Cu (90, 84, 81, and 71 at. % Ni) alloys. Results for plain-annealed and magnetic-annealed specimens. A 68% Ni Permalloy was investigated in cold worked, baked, and annealed conditions. Graphs and tables. 11 ref. (P16, Ni, Fe, Cu)

404-P. Gyromagnetic Effect in a Superconductor. R. H. Pry, A. L. Lathrop, and W. V. Houston. *Physical Review,* ser. 2, v. 86, June 15, 1952, p. 905-907.

The gyromagnetic ratio of a superconducting tin sphere was measured by the Einstein-DeHaas method. The result is approximately that to be expected on the picture of perfectly free superconducting electrons and is in agreement with the work of Kikoin and Gubar. Apparatus diagram and graph. (P15, Sn)

405-P. Radioactivities of Platinum and Iridium From Photonuclear Reactions in Platinum. Darleane Christian, Russel F. Mitchell, and Don S. Martin, Jr. *Physical Review,* ser. 2, v. 86, June 15, 1952, p. 946-950.

The products of photonuclear reactions induced in Pt by a 70-Mev. synchrotron X-ray beam were studied. No Os activities were found. The Ir fraction included two new isotopes. Relative yields of all radioactive isotopes were measured. Graphs. 14 ref. (P13, Pt, Ir, Os)

406-P. Comparison of Magnetoelastic Energy Losses and Magnetic Hysteresis in Ferromagnetic Materials. G. Bonfiglioli, A. Ferro, and G. Montalenti. *Physical Review,* ser. 2, v. 86, June 15, 1952, p. 959-961.

Compares values of losses in mechanical and magnetic hysteresis loops when the alteration (disregarding the sign) of domain structure produced by magnetic field or by mechanical stress is the same. Materials dealt with are Ni, alloy steel, carbon steel, pure annealed iron, and Armco iron. Table and graphs. 10 ref. (P16, Ni, AY, CN, Fe)

407-P. Relative Pair Production Cross Sections in the Energy Region 50 to 300 Mev. C. R. Emigh. *Physical Review,* ser. 2, v. 86, June 15, 1952, p. 1028-1035.

A cloud-chamber survey was made of pairs produced in Al, Ag, Au, and Th foils by an X-ray beam from the 300-Mev. betatron. By comparing the pairs produced in two of the foils mounted to intercept the same X-ray beam, values of relative pair production cross sections for Ag to Al, Au to Al, and Th to Al were found. Graphs and apparatus diagram. 12 ref. (P10, Al, Ag, Au, Th)

408-P. The Junction Transistor. Morgan Sparks. *Scientific American,* v. 187, July 1952, p. 29-32.

An account of underlying principles and present state of develop-

ment of one of two forms of a device that amplifies electricity by the flow of electrons in a crystal. Chiefly deals with germanium. Diagrams. (P15, T1, Ge)

409-P. (French.) **The Sign of the Thermo-Electric Electromotive Force of Silicon.** Jean Savornin and France Fourrier-Savornin. *Comptes Rendus hebdomadaires des Séances de l'Academie des Sciences,* v. 234, May 26, 1952, p. 2165-2167.

Experimental arrangement leading to the finding that contrary to theoretical expectations, Si is thermo-electrically positive. Bismuth was found to be the most simple negative body. (P15, Si, Bi)

410-P. (German.) **Measurement of Instantaneous Induction Values and Field Strengths, and of Magnetic Reversal Losses, of Electrical Sheets.** Willi Krug. *Archiv für das Eisenhüttenwesen,* v. 23, May-June 1952, p. 207-215.

Theoretical basis and construction of ferrometer, and its application to above measurements. The quality of the instrument is evaluated on the basis of the results. Graphs and diagrams. (P16, ST)

411-P. (English.) **Sorption of Gases on Metal Films.** F. C. Tompkins. *Zeitschrift für Electrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Apr. 1952, p. 360-363.

Mechanisms of sorbtion and methods for its study, with emphasis on catalytic effects. (P13)

412-P. (German.) **The Surface Condition of Copper Between 500 and 850° C.** F. Erdmann-Jesnitzer and F. Günther. *Zeitschrift für Electrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Apr. 1952, p. 386-389; disc., p. 389-390.

On the basis of the experiments, melting of surface layers 10^{-3} to 10^{-4} mm. thick, as described by K. Lichtenecker, is reconsidered. (P12, Cu)

413-P. (German.) **Energy Transmission Mechanism and Rate of Reaction on Metallic Surfaces.** K. Schäfer. *Zeitschrift für Electrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Apr. 1952, p. 398-403.

Experiments concerning the relationship between the energy-transmission mechanism to the adsorbed molecules, and their chemical reactions on the surfaces. The method of measurement establishing the thermal accommodation coefficient of ethane on the metallic surfaces of Pt-Cu alloys. Results are interpreted and an explanation of the phenomenon is proposed. Tables and graphs. (P13, Pt, Cu)

414-P. (German.) **Dissociation of Zirconium Iodide on Hot Metal Surfaces.** H. Döring and K. Moliere. *Zeitschrift für Electrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Apr. 1952, p. 403-407; disc., p. 407-408.

Measurements of reaction rate of above dissociation by the method of van Arkel and de Boer. Characteristic curve of growth rate with wire and vessel temperature and formation of iodides of lower valence. (P13, Zr)

415-P. (German.) **Electron Emission of a Silver Surface Caused by Iodine.** H. Paproth, W. Rathje, and I. N. Stranski. *Zeitschrift für Electrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Apr. 1952, p. 409-413; disc., p. 413-414.

Experiments in which the emission of negative electrons was observed. Dependence of the emission upon voltage and temperature; nature of the emitted electrons. Proposes theory of so-called chemoelectric emission as an explanation for the phenomenon. 13 ref. (P15, Ag)

416-P. (German.) **Heat of Fusion of Aluminum and Germanium.** Franz Eberhard Wittig. *Zeitschrift für Metallkunde,* v. 43, May 1952, p. 158-161.

Proposes improvements in the experimental set-up customary for investigations of heat fusion. The improvement is achieved mainly by using a control device developed by the author. Results achieved by the new method. Tables and diagrams. 13 ref. (P12, Al, Ge)

417-P. (Russian.) **Certain New Laws Connecting Values of Losses to Coercive Force.** N. S. Akulov and T. A. Elkina. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Mar. 21, 1952, p. 377-379.

A theoretical discussion. Conclusions are confirmed by experimental data on cobalt, 45% and 78% Permalloys, Alsifer, and a steel of unspecified composition. (P16, Co, ST, Ni, Fe)

418-P. (Russian.) **The Behavior of Superconducting Films in Magnetic Fields.** V. L. Ginzburg. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Mar. 21, 1952, p. 385-388.

A theoretical discussion. Graphical interpretation. (P15, P16)

419-P. (Russian.) **Magnetization Curves of Plastically Deformed Iron in Strong Fields.** N. S. Akulov and K. M. Bol'shova. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Apr. 21, 1952, p. 817-819.

Armco iron and an Fe alloy containing 4% Mo were used in experimental determination. Data are charted. (P16, Fe)

420-P. (Russian.) **Ferromagnetic Resonance in Parallel Wires.** V. K. Arkad'ev and A. G. Kotov. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Apr. 21, 1952, p. 821-824.

Iron and nickel wires were used in investigation of the above. Data are charted. (P16, Fe, Ni)

421-P. (Russian.) **Interphase Tension at the Boundary of Unmixed Liquid Metals.** P. V. Gel'd and S. K. Chuchmarev. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Apr. 21, 1952, p. 877-880.

The interphase tension between molten Pb and Zn was measured experimentally. Data are tabulated and illustrated. 14 ref. (P10, Pb, Zn)

422-P. (Russian.) **Fluidity of Ferrous Alloys.** N. N. Kurnakov and M. Ia. Troneva. "Izvestiia Sektora Fiziko-Khimicheskogo Analiza", v. 20 (Academy of Sciences of the USSR), p. 66-75.

A study was made of fluidity in the Fe-Si, Fe-P, and Fe-Cr systems. Data are tabulated and charted. 37 ref. (P10, Fe, Si, Cr)

423-P. Surface Losses in Electromagnetic Cavity Resonators. I. Paghis. *Canadian Journal of Physics,* v. 30, May 1952, p. 174-184.

In a study of the relation between surface roughness and resonator losses, effective skin resistance of brass was determined at microwave frequencies, by means of Q measurements. Micrographs, tables, graphs, and apparatus diagrams. 14 ref. (P16, S15, Cu)

424-P. The ABC's of Germanium. J. P. Jordan. *Electrical Engineering,* v. 71, July 1952, p. 619-625.

Germanium is one of the most important elemental semiconductors. Some of the mechanisms governing its behavior are presented in a simplified manner as background for the understanding of the physics of the industrial devices utilizing it. (P15, Ge)

425-P. Absorption of 2-Mev Constant Potential Roentgen Rays by Lead and Concrete. W. W. Evans, R. C. Granke, K. A. Wright, and J. G. Trump. *Radiology,* v. 58, April 1952, p. 560-567.

The Cu absorption curve and the half-value layer in Cu, Pb, and concrete were measured for these supervoltage rays and compared with the closely equivalent, though less intense, gamma rays from radioactive sources. The transmission of 2-million-volt constant potential X-rays through barriers of Pb and concrete was determined for both small and large beams. Absorption characteristics of Al. Graphs and tables. (P10, Pb, Cu, Al)

426-P. Gamma-Ray Absorption Coefficients. Charlotte Meaker Davisson and Robley D. Evans. *Reviews of Modern Physics,* v. 24, Apr. 1952, p. 79-107.

Absorption of radiation in the energy range 0.1-6 Mev. Results of the theories of Compton effect, photo-electric effect, and pair production are given in the form of equations, tables, and curves. Necessary considerations in studying absorption coefficients; results of various workers compared with theory. Concludes that, in this energy range, present theories give values of absorption coefficients which are in good agreement with those obtained experimentally. Includes tabular and graphical data for specific elements, including C, Fe, Al, Cu, Ag, Sn, Ta, Pt, and Pb. 64 ref. (P10)

427-P. Heterogeneity of Metal Surfaces. M. Boudart. *Journal of the American Chemical Society,* v. 74, July 20, 1952, p. 3556-3561.

Some consequences of induction in connection with problems in chemisorption and catalysis. The nature of "active centers" on a metal surface. 39 ref. (P13)

428-P. The Heats of Combustion of Thorium and Uranium. Elmer J. Huber, Jr., Charles T. Holley, Jr., and E. H. Meierkord. *Journal of the American Chemical Society,* v. 74, July 5, 1952, p. 3406-3408.

Precise measurements of the heats of combustion of Th, U, and UO_2 were made and, from the results, heats of formation of ThO_2, UO_2, and U_3O_8 were calculated. (P12, Th, U)

429-P. The Grain Boundary Energy, Its Measurement and Influence Upon the Properties of Metals and Alloys. T. B. Massalski. *Journal of the Birmingham Metallurgical Society,* v. 32, June 1952, p. 38-59.

Experimental and theoretical evidence referring to origins, variation, and action of the energy associated with various grain boundaries and surfaces. Theories of the nature of the grain-boundary structure. Diagrams and graphs. 27 ref. (P12, M27)

430-P. Magnetostriction of Some Ferromagnetic Alloys. E. W. Lee. *Journal of the Iron and Steel Institute,* v. 171, June 1952, p. 160-164.

A simple apparatus which com-

prises a double roller and mirror system is capable of giving accurate measurements of magnetostriction of ferromagnetic rods. The apparatus was used to study the magnetostriction of some alloys, including the Ni-Co system. Temperature coefficients of magnetostriction of four Ni alloys were measured. Data are given for Co, 4 Ni-Fe alloys; 2 Ni-Si alloys; Monel; Mangonic; and 8 Ni-Co alloys. Apparatus diagram and graphs. 15 ref.
(P16, Ni, Co, Fe, SG-n, p)

431-P. The Thermodynamics of Substances of Interest in Iron and Steel Making. III. Sulphides. F. D. Richardson and J. H. E. Jeffes. *Journal of the Iron and Steel Institute,* v. 171, June 1952, p. 165-175.

A survey of available data on thermodynamics of sulfides and of gaseous sulfur compounds of interest in iron and steelmaking. The results are plotted on free-energy vs. temperature diagrams, and equations and likely accuracies are quoted for each substance. 66 ref. (P12, Fe, ST)

432-P. Magnetic Properties, Internal Strains and the Bauschinger Effect in Metals. D. V. Wilson. *Nature,* v. 170, July 5, 1952, p. 30-31.

Diagram summarizes results showing that, in the case of a heat treated 0.88% C steel, change in indentation hardness which results from a moderate degree of deformation is dependent on microstructure. Up to a certain limit, with increasing initial hardness, magnitude of the softening effect increases progressively. At higher hardness values, observed softening is less, although initial internal strain energy continues to increase with hardness. Martensite tempered below about 140° C. does not show the softening effect. A possible explanation of these effects. (P16, Q25, CN)

433-P. Thermal and Electrical Conductivity of Porous Metals Made by Powder Metallurgy Methods. P. Grootenhuis, R. W. Powell, and R. P. Tye. *Proceedings of the Physical Society,* v. 65, sec. B, July 1, 1952, p. 502-511.

Measurements of thermal conductivity and electrical resistivity over the range of 20-200° C. are reported for several specimens of a sintered porous bronze material (89% Cu, 11% Sn). Suggestions are made for estimating the thermal conductivities of similar porous materials. Graphs. 21 ref. (P11, P15, Cu)

434-P. Heat Transport in Lead-Bismuth Alloys. J. L. Olsen. *Proceedings of the Physical Society,* v. 65, sec. A July 1, 1952, p. 518-532.

Variation with temperature and with magnetic field of the heat conductivity of a series of Pb-Bi alloys was measured. Estimates were made from the experimental data of the processes contributing to the heat conductivity, and of resistances due to the various scattering mechanisms limiting these conductivities. Numerous graphs. 17 ref.
(P11, Pb, Bi)

435-P. Infra-Red Absorption by Metals at Low Temperatures. K. G. Ramanathan. *Proceedings of the Physical Society,* v. 65, sec. A, July 1, 1952, p. 532-540.

The infrared absorptivities of several electropolished metal surfaces were measured at liquid-He temperatures with a specially designed radiation cryostat with a black body at room temperature as the source and a differential He-gas thermometer as the detector. The absorptivities of the normal metals, which include a number of alloys, are compared with values calculated by various theories of metallic reflection. Diagrams and tables. (P17)

436-P. The Spectral Emissivities of Iron, Nickel, and Cobalt. H. Lund and L. Ward. *Proceedings of the Physical Society,* v. 65, sec. B, July 1, 1952, p. 535-540.

Spectral emissivities were measured by direct comparison of surface and black-body radiation between 1000 and 1300° C. over the wavelength range of 1.0-2.6μ using a PbS cell and amplifier as the detecting unit. Diagrams, tables and graphs. 13 ref. (P17)

437-P. A Note on the Theory of Conduction in Metals. E. H. Sondheimer. *Proceedings of the Physical Society,* v. 65, sec. A, July 1, 1952, p. 561-562.

Considers various theories and points out cases where the conventional idea does not apply. Implications of the new theory as applied to the properties of bismuth.
(P11, Bi)

438-P. The Thermal Conductivity of Metals at Low Temperatures. E. H. Sondheimer. *Proceedings of the Physical Society,* v. 65, sec. A, July 1, 1952, p. 562-564.

The theory of thermal conductivity is compared with experimental results reported by recent investigations. (P11)

439-P. Measurement of the Thermal Accommodation Coefficients of Gases. A. E. J. Eggleton, F. C. Tompkins, and D. W. B. Wanford. *Proceedings of the Royal Society,* ser. A, v. 213, June 24, 1952, p. 266-273.

Relates partly to the chemisorption of gases on metals. Theoretical and experimental checks were made on the techniques of Roberts and Bremmer. Experimental values for neon at a tungsten surface. Apparatus diagrams and graphs. (P13, W)

440-P. Interphase Interfaces. Cyril Stanley Smith. "Imperfections in Nearly Perfect Crystals," (John Wiley & Sons, New York), 1952, p. 377-401.

Values for interfacial free energy for interfaces involving one solid and a second solid or liquid phase. The data are fragmentary. Additional data, mostly from alloy systems, are tabulated, showing the ratio between two solid-solid interfaces, one of which is usually a grain boundary. Shows experimentally that energy of the interface between two different crystal lattices in metallic phases is almost invariably lower than energy of a grain boundary between two crystals of the same phase differing only in orientation. 12 ref. (P10)

441-P. Surface and Interfacial Tensions of Single-Phase Solids. J. C. Fisher and C. G. Dunn. "Imperfections in Nearly Perfect Crystals" (John Wiley & Sons, New York), 1952, p. 317-343; disc., p. 343-351.

Published values of surface and interfacial tensions of single-phase solids are collected, evaluated, and tabulated. Several errors in the literature are corrected. Reasonably good values are obtained for the surface tensions of solid Cu, Ag, and Au, for the grain and twin boundary tensions in Cu, and for the variation in grain-boundary tension with orientation of adjacent grains in silicon iron, Sn, and Pb. 51 ref. (P10, Cu, Ag, Fe, Sn, Pb)

442-P. (English.) **On the Structure and Properties of Some Metal and Metal Oxide Films.** Georg Hass and Noel W. Scott. *Centre National de la Recherche Scientifique,* "Les Properiétés Optiques des Lames Minces Solides", 1950, p. 90-98.

Electron-microscope study of the structure and optical properties of vacuum-deposited Ag, Al, Ge, Si, and SiO films. Results charted and illustrated. (P17, M26, L25, Ag, Al, Ge, Si)

443-P. (English.) **Some Current Developments in Multilayer Optical Films.** A. F. Turner. *Centre National de la Recherche Scientifique,* "Les Proprietes Optiques des Lames Minces Solides," 1950, p. 140-156.

Achromatic anti-reflection coatings; cold mirrors; selective metallic reflectors; interference filters with multiple dielectrics; and frustrated total-reflection filters. (P17)

444-P. (French.) **Graphical Study of the Optical Properties of Thin Metallic Films.** D. Malé. *Centre National de la Recherche Scientifique,* "Les Propriétés Optiques des Lames Minces Solides", 1950, p. 28-32. (P17)

445-P. (French.) **Optical Properties of Thin Films of Silicon.** P. Cotton. *Centre National de la Recherche Scientifique,* "Les Propriétés Optiques des Lames Minces Solides,' 1950, p. 71-75.

Preparation by vacuum deposition. Apparatus diagrammed; results charted and illustrated. (P17, L25, Si)

446-P. (French.) **Evolution of Certain Optical Properties of Very Thin Metallic Films.** M. Perrot. *Centre National de la Recherche Scientifique,* "Les Propriétés Optiques des Lames Minces Solides", 1950, p. 81-85.

Vacuum apparatus used. Results of study of Ag films on glass. (P17, Ag)

447-P. (French.) **Optical Properties of Thin Platinum Films and Their Comparison With Those of Other Metals.** P. Rouard. *Centre National de la Recherche Scientifique,* "Les Propriétés Optiques des Lames Minces Solides", 1950, p. 86-89.

Study of very thin films of Pt deposited on glass shows the existence of a very distinct minimum of the glass-metal reflection factor for a thickness of about 25 A. (P17, Pt)

448-P. (French.) **Theoretical Study of Quintuple Layers of the Type Ag-MgF_2-Ag-MgF_2-Ag.** Ch. Dufour. *Centre National de la Recherche Scientifique,* "Les Proprietes Optiques des Lames Minces Solides," 1950, p. 109-113.

Theory of the interferometric combination formed by the coupling of two Fabry-Perot standards (with two films fused into one) can be applied to 5-fold thin films of the type: metal, nonabsorbing film, metal, non-absorbing film, metal. Such complex films can form monochromatic interference filters if certain conditions are fulfilled. (P17, Ag)

449-P. (English.) **The Reflectivity of Thin Silver Films and the Performance of the Fabry-Perot Interferometer.** H. Kuhn. *Centre National de la Recherche Scientifique,* "Les Proprietes Optiques des Lames Minces Solides," 1950, p. 118-120. (P17)

450-P. (French.) **Optical Properties of Thin Solid Films.** P. Cotton and P.

Rouard. *Centre National de la Recherche Scientifique,* "Les Proprietes Optiques des Lames Minces Solides", 1950, p. 157-175.

A classified review. Preparation, properties and applications. 248 ref. (P17, L25)

451-P. (German.) **Melting of Cadmium.** Lucie Apelt. *Metalloberfläche,* ser. B, v. 4, July 1952, p. B107-B108.

Vapor-pressure curve for Cd. Significance of observations in comparison with other metals. (P12, E10, Cd)

452-P. (German.) **Behaviour of Molybdenum and Nickel and Some Molybdenum-Nickel-Alloys in Acid Electrolytes.** Georg Masing and Günther Roth. *Werkstoffe und Korrosion,* v. 3, May-June 1952, p. 176-186; July 1952, p. 253-262.

Potential of the Mo electrode depends on pH. This dependence is explained in analogy to Sb. In anodic dissolution, if current density is not too small, Mo follows the relation of Tafel. Divergences are explained. A method for indirect measurement of oxygen-depolarization of different metals permits absolute determination of dissolved O_2 in the electrolyte by electrochemical means. From the results, acid resistance of Mo and its alloys can be explained. Second part deals especially with Ni and Ni-Mo alloys, and with a method for measuring the role of oxygen in corrosion. 65 ref. (P15, R2, Ni, Mo)

453-P. (French.) **Hall Effect of Iron and Nickel at Low Temperatures.** J. P. Jan and H. M. Gijsman. *Physica,* v. 18, May 1952, p. 339-355.

Hall effect was measured at 14, 20, 64, 83, and 293° K. Hall electric field per unit current density was plotted as a function of magnetic induction in the sample. "Extraordinary" Hall constant, as well as field parameter, was determined. Experiments show that a new parameter, transverse electro-magnetic conductivity, has a temperature variation simpler than the classical Hall constant. 16 ref. (P15, Fe, Ni)

454-P. (German.) **Gases in Metals.** P. Bardenheuer. *Metall,* v. 6, July 1952, p. 351-356.

The solubility of gases in metals, particularly the role of hydrogen. Gas absorption of metals, and effects of reaction gases. Degasification of metal melts. Data are charted. 11 ref. (P12, E25)

455-P. (German.) **Pyrophoric Metals.** D. A. Pospekhov. *Metall,* v. 6, July 1952, p. 371-374. *(Translated from Zhurnal Prikladnoi Khimii.)*

Previously abstracted from original. See item 3A-126, 1949. (P11)

456-P. (German.) **The Iron-Chlorine System. II. The Equilibrium of the Reaction $FeCl_2$ (Gas) + H_2 = Fe + 2HCl.** Harald Schäfer and Kurt Krehl. *Zeitschrift für anorganische und allgemeine Chemie,* v. 268, No. 1-2, 1952, p. 35-46.

Includes thermodynamic computation of reactions of α, β, and γ-iron and $FeCl_2$. Graphs, and tables. 19 ref. (P12, P13, Fe)

457-P. (Russian.) **Solubility of Nitrogen in Iron-Chromium Alloys.** K. T. Kurochkin, P. V. Gel'd, and V. I. Iavoiskii. *Doklady Akademii Nauk SSSR, new ser.,* v. 84, May 11, 1952, p. 329-332.

A study was made using alloys with 3.56-66% Cr and N_2 pressures of 512 and 735 mm. of Hg at temperatures of 1500 and 1670° C. Data are tabulated and charted. (P13, Fe)

458-P. (Swedish.) **Three-Dimensional Space Representation of Free Energy in Ternary Systems.** Erik Rudberg. *Jerkontorets Annaler,* v. 136, No. 5, 1952, p. 91-112.

The general properties of the Gibbs' free-energy function for ternary systems, particularly in relation to geometric representation as a series of single-phase curved surfaces suspended above the composition triangle. The various equilibrium characteristics of such systems, and the trend of reactions in non-equilibrium situations, are governed by the downward convexity exhibited by these surfaces over stable phase regions. (P12)

459-P. Permanent Magnets From Powdered Iron. B. Kopelman. *Electrical Manufacturing,* v. 50, Aug. 1952, p. 88-91, 328.

See abstract of "Permanent Magnets from Ultrafine Iron Powder," *Electrical Engineering,* item 263-P, 1952. (P16, H general, Fe, SG-n)

460-P. The Electrical Resistance of Binary Metallic Mixtures. Rolf Landauer. *Journal of Applied Physics,* v. 23, July 1952, p. 779-784.

A theory for a random mixture, based on the assumption that each crystal acts as if surrounded by a homogeneous medium whose properties are those of the mixture. Comparisons with experiment. 18 ref. (P15)

461-P. Superconductivity in the Cobalt-Silicon System. B. T. Matthias.

Physical Review, ser. 2, v. 87, July 15, 1952, p. 380.

A Co-Si melt with 75% Si was found to become superconducting at 1.33° K. X-ray analysis shows two phases: pure Si and $CoSi_2$, in roughly equal proportions. (P15, Co, Si)

462-P. Single-Crystal Germanium. G. K. Teal, M. Sparks, and E. Buehler. *Proceedings of the I.R.E.,* v. 40, Aug. 1952, p. 906-909.

The single-crystal Ge now being employed for transistors and for the parallel development of a variety of rectifier and photocell devices. Graphs. 12 ref. (P15, Ge)

463-P. Properties of Metals Below −300 F. W. T. Ziegler. *Refrigerating Engineering,* v. 60, Aug. 1952, p. 848-852; disc., p. 852.

Mechanical properties; specific heat; thermal expansion; electrical conductivity; and thermal conductivity. Graphs and 25 ref. (P11, P12, P15, Q general)

464-P. Navy Develops New Permanent Magnetic Material. *Steel,* v. 131, July 28, 1952, p. 76-77.

An alloy of manganese bismuthide and unreacted Mn and Bi have the highest recorded coercive force of any known permanent-magnet material. Magnets are made by powder-metallurgy techniques. (P16, H general, Mn, Bi, SG-n)

465-P. Solutions in Liquid Iron. Part 2. The Influence of Sulphur on the Solubility and Activity Coefficient of Carbon. J. A. Kitchener, J. O'M. Bockris, and D. A. Spratt. *Transactions of the Faraday Society,* v. 48, July 1952, p. 608-617.

The solubility of graphite in liquid iron was measured from 1200-1700° C. with addition of 0-1.4% S. Thermodynamic and structural significance of the results. Graphs and tables. 21 ref. (P12, Fe)

466-P. (English.) **The Change of Conductivity of Metals in Strong Magnetic Fields.** Yasaku Tanabe. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Feb. 1951, p. 91-106.

Change of resistance in a transverse magnetic field was studied in strong magnetic fields at room temperature. The metals studied were Te, Ce, Sb, Fe, Co, and Ni. It was found that there is a distinct difference in the change of resistance between ordinary and ferromagnetic metals. The difference was found to be caused by the fundamental difference in origin of the conduction electrons. (P16, Te, Ce, Sb, Fe, Co, Ni)

467-P. (English.) **On the Width of Forbidden Energy Zone of Tellurium.** Tadao Fukuroi. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Apr. 1951, p. 175-181.

The zone for pure Te at the absolute zero of temperature, and its variation resulting both from thermal dilation and from thermal vibration induced in the crystal lattice when the temperature is increased. (P12, M26, Te)

468-P. (English.) **On the Vibrational Spectrum and the Vibrational Specific Heat of a Binary Superlattice Alloy.** Yoshio Shibuya, Yoshüchi Fukuda, and Tadao Fukuroi. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Apr. 1951, p. 182-186.

Houston's approximate method of finding the frequency distribution function was applied to calculation of vibrational specific heat of β-brass in the state of any specified degree of order. It is shown that the vibrational specific heat of the disordered alloy is generally larger than that of the ordered one at ordinary temperatures. (P12, Cu)

469-P. (English.) **Fundamental Researches on Smelting of Sulphide Ores. VIII. On the Equilibrium in the Reduction of Solid Stannous Sulphide by Hydrogen Gas.** Kingo Sudo. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Apr. 1951, p. 187-193.

Equilibrium was measured by a flow method and equilibrium constants determined between 533 and 679° C. Experimental results are summarized in empirical equations. Heat and standard free-energy changes for the formation of solid SnS from the elements at room temperature are calculated. (P12, C21, Sn)

470-P. (English.) **Reduction Equilibria of Iron Oxides. III. Measurement of the Equilibrium of the Reaction.** Koji Sanbongi. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Apr. 1951, p. 194-200.

Equilibrium was measured in the range 1530-1670° C. and an equation was obtained for the temperature function of the equilibrium constant. Dissociation pressure of molten FeO was calculated. (P12, D general, Fe)

471-P. (French.) **Combustion of Aluminum in Air.** René de Salins. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, June 16, 1952, p. 2437-2439.

Combustion experiments with Al powder in air, by means of a sta-

tionary flame. Details of the experiments. Flame-spectra lines are tabulated and discussed. (P17, Al)

472-P. (French.) Charges in the Electrical Conductivity of Metals During Their Fusion. Genevieve Sutra. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, June 30, 1952, p. 2589-2591.

Electrical conductivity undergoes an abrupt change at the melting point. Contrary to present opinion, it is shown that this variation is definitely related to volume variation. Data for various metals are tabulated and charted. (P15)

473-P. The Metal Germanium and Its Use in the Electronics Industry. Anthony S. Rugare. *Metal Progress,* v. 62, Aug. 1952, p. 97-103.

Production, properties, and applications—mainly as a semi-conductor, processing of Ge billets, "doping" with "donor" (As, Sb, P, or Bi) or "acceptor" (Al) materials, and heat treatment. Crystal and atomic structure and theory of semiconductors as applied to Ge. (P15, T1, M25, M26, Ge)

474-P. (Book) Ferromagnetic Properties of Metals and Alloys. K. Hoselitz. 317 pages. 1952. Oxford University Press, 114 5th Ave., New York 11, N. Y.; or Amen House, London E.C. 4, England. $8.00.

Comprehensive account of present-day theories of the magnetization curve. Attempts to demonstrate the connection between properties obtained in practice and existing theoretical explanations. The composition and properties of soft magnetic materials, as well as those of magnetic analysis for determination of constitution and structure of ferromagnetic metals and alloys. The potential application of magnetic methods to metallurgical problems. (P16, M27, SG-n, p)

475-P. (Book) (French.) Les Propriétés Optiques des Lames Minces Solides. (Optical Properties of Thin Solid Films.) 176 pages. 1950. Centre National de la Recherche Scientifique, 45 Rue d'Ulm, Paris 5, France.

A collection of articles by American, British, and French scientists. Theoretical research, various techniques for the preparation of films, experimental research on optical properties, and diversified applications. Presented at Marseille, Apr. 19-23, 1949. Selected papers are separately abstracted. (P17, L25)

476-P. The Electrokinetics of Hydrogen Evolution. III. Hydrogen Overvoltage at Electrodeposited Copper Cathodes. William P. Senett and C. F. Hiskey. *Journal of the American Chemical Society,* v. 74, Aug. 5, 1952, p. 3754-3760.

Includes overvoltage measurements as a function of current density and temperature, and a study of time variations. Theory. Tables, graphs, and apparatus diagram. 14 ref. (P15, Cu)

477-P. Studies on Some Metal Electrodes. Part IX. The Temperature Coefficients of the Copper and Antimony Electrodes in Solutions Initially Free From Their Ions. The Mode of Oxidation of These Metals. A. Riad Tourky and E. M. Khairy. *Journal of the Chemical Society,* July 1952, p. 2626-2633.

Results are discussed in the light of the theory of lattice defects. (P15, R2, Cu, Sb)

478-P. A New Calculation of Some Properties of Metallic Beryllium. B. Donovan. *Philosophical Magazine,* ser. 7, v. 43, Aug. 1952, p. 868-874.

A quantum mechanical calculation of lattice constant, compressibility, cohesive energy, and work function of Be was carried out, using an extension of the cellular method of Wigner and Seitz. With exception of work function, the results agree satisfactorily with experiment and compare favorably with values obtained by more elaborate methods. Graphs. 14 ref. (P10, P15, Be)

479-P. The Electrical Resistance of Magnesium, Aluminium, Molybdenum, Cobalt, and Tungsten at Low Temperatures. J. G. Thomas and E. Mendoza. *Philosophical Magazine,* ser. 7, v. 43, Aug. 1952, p. 900-910.

Measurements of resistance in zero magnetic field; magnetoresistance and susceptibility. Graphs. 23 ref. (P15, Mg, Al, Mo, Co, W)

480-P. The Extra Electrical Resistance Due to Cold Work and Neutron Irradiation of Platinum. R. A. Dugdale. *Philosophical Magazine,* ser. 7, v. 43, Aug. 1952, p. 912-914.

Results of recent experiments on fixing of the extra resistance produced in Pt wire by cold work and by neutron bombardment. (P15, Pt)

481-P. The Coherent Neutron Scattering Cross Sections of Nitrogen and Vanadium. S. W. Peterson and Henri A. Levy. *Physical Review,* ser. 2, v. 87, Aug. 1, 1952, p. 462-463.

Neutron-diffraction measurements on vanadium nitride, vanadium carbide, and potassium azide show the coherent neutron scattering cross section of nitrogen to be 11.1 ± 0.3 barns, positive phase; and that of vanadium to be 0.029 ± 0.01 barn, negative phase. 11 ref. (P10, V)

482-P. Some Post-War Developments in Magnetism. L. F. Bates. *Proceedings of the Physical Society,* v. 65, sec. A, Aug. 1, 1952, p. 577-594.

A survey. 18 ref. (P16, SG-n; p)

483-P. Analysis of Polarized Light Reflected From Absorbing Materials at Normal Incidence. J. Woodrow, B. W. Mott, and H. R. Haines. *Proceedings of the Physical Society,* v. 65, sec. B, Aug. 1, 1952, p. 603-616.

Expressions derived for intensity of analyzed light reflected from absorbing crystals under crossed polarizing units and with the analyzer slightly rotated from the crossed position. Relationships are illustrated by experimental curves on specimens of Sn, U, Bi, and stibnite. Graphs. 13 ref. (B17, Sn, U, Bi)

484-P. The Magneto-Resistance of Ferromagnetic Al-Si-Fe Alloys. R. Parker. *Proceedings of the Physical Society,* v. 65, sec. B, Aug. 1, 1952, p. 616-620.

By extending the treatment in an earlier paper, an equation is derived for saturation magneto resistance of mixed ferromagnetic alloys as a function of composition and temperature. Results are in agreement with experiment for the Al-Si-Fe alloy system.

(P16, Al, Si, Fe, SG-n, p)

485-P. Transparent Conducting Films. E. J. Gillham and J. S. Preston. *Proceedings of the Physical Society,* v. 65, sec. B, Aug. 1, 1952, p. 649.

Results of observations on very thin gold films on glass and on oxide substrates, with respect to resistivity and optical properties.

(P15, P17, Au)

486-P. Area Contacts on Germanium. J. W. Granville and H. K. Henisch. *Proceedings of the Physical Society,* v. 65, sec. B, Aug. 1, 1952, p. 650-651.

Observations of Au contacts applied by evaporation in a vacuum to n-type germanium of 5 ohm-cm. resistivity and a Hall coefficient of about 10^4 cc. per coulomb. Graphs. (P15, Ge, Au)

487-P. Contact Properties of p-Type Germanium. J. W. Granville, H. K. Henisch, and P. M. Tipple. *Proceedings of the Physical Society,* v. 65, sec. B, Aug. 1, 1952, p. 651-652.

Results of experimental study. (P15, Ge)

488-P. Influence of Added Elements and Condition of Graphite Upon Electrical Resistance of Cast Iron. Ichiro Iitaka and Kazuhiko Sekiguchi. *Reports of the Casting Research Laboratory,* No. 3, 1952, p. 23-25.

Results of experiments charted, tabulated, and discussed. (P15, CI)

489-P. (German.) **The Conductivity of Pure Copper and the Effects of Additions on This Conductivity.** F. Pawlek. *Metall,* v. 6, Aug. 1952, p. 434-435.

Conductivity of 99.997% pure sintered Cu wire, and increases in conductivity caused by small additions of Fe, Sb, Pb, As, Ni, Si, P, Ag, and Cd were determined. Details of the experiments; data are charted. (P15, Cu)

490-P. (German.) **Electrochemical Transformations in Friction Systems at Elevated Temperatures, and Their Influence on Wear in Machines.** H. Schiffers. *Metalloberfläche,* sec. A, v. 6, Aug. 1952, p. A120-A124.

The mechanism of friction, and the special conditions existing in machinery. Electrochemical transformations and laws governing these transformations. Data are tabulated. 14 ref. (P15, Q9)

491-P. (German.) **Density Measurements on Molten Germanium and Tellurium.** W. Klemm, H. Spitzer, W. Lingenberg, and H. J. Junker. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften,* v. 83, No. 3, 1952, p. 629-637.

The distinction between metals, "meta" metals, semiconductors, and nonmetals. On the nonmetallic side of the metal-nonmetal boundary, there are especially large interstitial lattice spaces which always are reduced in volume upon melting, after expanding upon melting. The volume of Te contracts again when the melting process is completed. Tables, diagrams, graphs. 15 ref. (P10, N12, Ge, Te)

492-P. Study of Metal-Ceramic Interactions at Elevated Temperatures. F. H. Norton and W. D. Kingery. *U. S. Atomic Energy Commission,* NYO-3139, Apr. 1, 1952, 65 pages.

Reviews literature pertaining to carbide, nitride, and sulfide reactions with metals. Samples of nitrides and carbides were prepared for use in reaction and surface-tension studies. Surface tension and wettability data for Fe, Ni, and Si on ceramic oxides. Additional improvements and tests of a microscopic furnace for sintering studies. Preparation of spherical particles of alumina and zirconia.

(P10, H10, H15, Fe, Ni, Si, C-n)

493-P. Vibralloy—a New Ferromagnetic Alloy. M. E. Fine. *Bell Laboratories Record,* v. 30, Sept. 1952, p. 345-348.

Cold-worked Fe-Ni alloys containing 9% Mo whose temperature coefficient of elastic modulus may be controlled over a wide range. Also

they have substantial ferromagnetic permeability and high mechanical strength. Graphs show variation of Young's modulus and permeability with temperature and composition. (P16, Q21, Fe, Ni, SG-n, p)

494-P. Ultrathin Magnetic Alloy Tapes With Rectangular Hysteresis Loops. M. F. Littmann. *Electrical Engineering,* v. 71, Sept. 1952, p. 792-795.

The alloys chosen for study were those having high permeability and relatively high resistivity to minimize eddy-current effects. They were as follows: 3% Si iron; 48% Ni + 52% Fe; 79% Ni + 4% Mo + 17% Fe; and 79% Ni + 5% Mo + 16% Fe. They were rolled to thicknesses between ⅛ and 1 mil. D.C. magnetization curves, hysteresis loops, and variation of ratio of residual to maximum induction with magnetizing force for ¼-mil cores are charted. (P16, Fe, Ni, SG-n, p)

495-P. Electrical Contact Resistance Between Metallic Surfaces Subjected to Various Treatments. T. Fukuroi and Y. Muto. *Engineers' Digest,* v. 13, Aug. 1952, p. 261-262. (Condensed from *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, June 1951, p. 281-291).

Test apparatus and experimental results obtained with tungsten rods subjected to the following treatments: mechanical polishing, electropolishing, and electrolytic etching. Diagrams and tables. (P15, W)

496-P. How Ferromagnetism Works. R. H. Esling. *Iron Age,* v. 170, Sept. 11, 1952, p. 148-152.

Basic principles of ferromagnetism for understanding varied equipment such as electric generators and motors, lifting magnets, solenoids in switches and valves, and permanent-magnet applications. Diagrams. (P16, ST)

497-P. Measurement of the Internal Energy in Copper Introduced by Cold Work. Benjamin Welber. *Journal of Applied Physics,* v. 23, Aug. 1952, p. 876-881.

Interpretation of a determination made on the ratio of stored energy to the energy expended in cold working Cu by twisting. Ratios of about 0.03 were found in three cylindrical samples which were cold worked to the extent of 8-12 cal. per g. 17 ref. (P12, Q24, Cu)

498-P. Phosphorus-Oxygen Equilibria in Liquid Iron. J. B. Bookley, F. D. Richardson, and A. J. E. Welch. *Journal of the Iron and Steel Institute,* v. 171, Aug. 1952, p. 404-412.

Study of thermodynamics of the P-O_2 equilibrium in liquid Fe by bringing the P content of liquid Fe to equilibrium with a mixture of tetracalcium phosphate ($Ca_4P_2O_9$) and CaO, and a controlled-gas atmosphere of water vapor and H_2. Graphs. 11 ref. (P12, Fe)

499-P. Effect of Manganese on the Activity of Sulphur in Liquid Iron and Iron-Carbon Alloys. J. P. Morris. *Journal of Metals,* v. 4, Sept. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 939-940.

Experimental procedure and results of study. Tables and graphs. (P12, Fe)

500-P. Heats of Solution of Group I-B Metals in Liquid Tin. L. B. Ticknor and M. B. Bever. *Journal of Metals,* v. 4, Sept. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 941-945.

An isothermal calorimeter for measurements of heats of solution in liquid tin. Measurements of the heats of solution of Au, Ag, Cu, and an Au-Ag alloy; and heat of formation of Au-Ag alloys. Tables and diagrams. 13 ref. (P12, Au, Ag, Cu)

501-P. The Specific Heats of Several Metals Between 1.8° and 4.2° K. I. Estermann, S. A. Friedberg, and J. E. Goldman. *Physical Review,* v. 87, Aug. 15, 1952, p. 582-588.

Specific heats of Mg, Ti, Zr, and Cr were measured between 1.8° and 4.2° K by the vacuum calorimeter method. Electronic contribution to specific heats of these metals was in agreement with the Sommerfeld theory and with results of recent detailed calculations of energy bands in transition metals. (P12, Mg, Ti, Zr, Cr)

502-P. Measurements on the Temperature, Current, Magnetic Field. Phase Diagram of Superconductivity. K. Mendelssohn, C. Squire, and Tom. S. Teasdale. *Physical Review,* v. 87, Aug. 15, 1952, p. 589-591.

Experiments were carried out to investigate the existence of a paramagnetic effect, at the transition to superconductivity. Work deals with induction measurements at constant values of magnetic field, current, and temperature. Diagrams and graphs. (P16, M24)

503-P. Carriers of Electricity in Metals Exhibiting Positive Hall Effects. Sheldon Brown and S. J. Barnett. *Physical Review,* v. 87, Aug. 15, 1952, p. 601-607.

Momentum associated with current in metals was measured under conditions in which they are known to have positive Hall coefficients.

A coil of the wire was supported with its axis vertical. Extremely small deflections resulting from inertial effect of successive reversals of current were measured by a resonance method. Phototube and oscilloscope method for measuring both amplitude and phase of small deflections. (P15)

504-P. Progress in Core Material for Small Transformers. C. C. Horstman. *Westinghouse Engineer,* v. 12, Sept. 1952, p. 160-163.

Emphasis on Si steel (Hipersil) cores. Magnetic and electrical properties are charted. Fabrication equipment and procedures. (P15, P16, G general, AY)

505-P. (French.) Dilatometric Study of Metallic Gadolinium. Felix Trombe and Marc Foex. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 235, July 7, 1952, p. 42-44.

Metallic Gd was investigated at temperatures between −195 and 300° C. Results are charted and interpreted. (P11, Gd)

506-P. (German.) Studies on the Anodic Behavior of Nickel. I. G. Trümpler and Hch. Meyer. *Helvetica Chimica Acta,* v. 235, No. 4, 1952, p. 1304-1310.

Experimental arrangement and results of investigation. Apparatus described makes it possible to follow the transition from an active state to a strongly passive one, also the reverse process. (P15, Ni)

507-P. (German.) Heat Transfer in Metal Melts in the Immediate Neighborhood of the Solid-Liquid Phase Boundary. Otto Schaaber. *Zeitschrift für Metallkunde,* v. 43, July 1952, p. 251-258.

The stationary heat flow near the fusion points of Zn, Al, and KNO_3 in vertical and horizontal directions was investigated. Experimental details and results. Proposes an explanation for peculiarities of the flow observed in a horizontal direction. Charts and diagrams. 12 ref. (P11, N12)

508-P. (German.) The Electrical Resistance of Thin Tin Films With Lattice Distortions. Johannes Niebuhr. *Zeitschrift für Physik,* v. 132, No. 4, July 1952, p. 468-481.

Study with different Sn thicknesses and temperature. Theoretical explanation of increasing specific resistance with decreasing thickness. Graphs and tables. 21 ref. (P15, Sn)

509-P. (Russian.) Investigation of Ferromagnetic Resonance in Cr-Te Alloys. T. M. Perekalina. *Doklady Akademii Nauk SSSR,* new ser., v. 84, May 21, 1952, p. 475-476.

An experimental study of the Cr alloys containing 50 at.% Te. Data are charted. (P16, Cr, Te)

510-P. (Russian.) The Influence of Halide Ions on the Adsorption of Organic Cations by the Surface of Iron. Z. A. Iofa, E. I. Liakhovetskaia, and K. Sharifov. *Doklady Akademii Nauk SSSR,* new ser., v. 84, May 21, 1952, p. 543-546.

Data are tabulated and charted. 13 ref. (P13, Fe)

511-P. (Russian.) Paramagnetic Resonance Absorption in Metals. S. A. Al'tshuler, V. Ia. Kurenev, and S. G. Salikhov. *Doklady Akademii Nauk SSSR,* new ser., v. 84, June 1, 1952, p. 677-679.

Investigated for 20 nonferrous metals. Data are tabulated and charted. (P16, EG-a)

512-P. (Russian.) Temperature Dependence of the Magnetic Strength of Iron-Nickel Alloys. E. F. Kuritsyna. *Doklady Akademii Nauk SSSR,* new ser., v. 84, June 1, 1952, p. 687-688.

Fe-Ni alloys containing 35, 50, and 78.5% Ni were investigated. Data are charted. (P16, Fe, Ni)

513-P. (Russian.) The Influence of Pressure on the Solubility of Molecular Hydrogen in the β-phase of the Palladium-Hydrogen System. P. S. Perminov, A. A. Orlov, and A. N. Frumkin. *Doklady Akademii Nauk SSSR,* new ser., v. 84, June 1, 1952, p. 749-752.

An experimental study. Data are tabulated and charted. (P13, Pd)

514-P. (Russian.) Adsorption and Solution of Hydrogen by Dispersed Palladium-Rhodium Alloys. I. P. Tverdovskii and A. I. Stetsenko. *Doklady Akademii Nauk SSSR,* new ser., v. 84, June 11, 1952, p. 997-1000.

An experimental study. Data are charted. (P13, Pd, Rh)

515-P. (Russian.) Study of Liquid Iron-Phosphorus Alloys by an Electromotive-Force Method. O. A. Esin, L. K. Gavrilov, and N. A. Vatolin. *Doklady Akademii Nauk SSSR,* new ser., v. 85, July 1, 1952, p. 87-89.

The Fe-P system was studied in relation to melt-slag reactions. Data tabulated and charted. (P12, Fe, ST)

516-P. The Reactions of Titanium Tetraiodide on Heated Titanium and Tungsten Surfaces. T. R. Ingraham and L. M. Pidgeon. *Canadian Journal of Chemistry,* v. 30, Sept. 1952, p. 694-697.

A study in relation to refining problems. When TiI_4 is passed over a hot bar of Ti metal, reactions depend on whether temperature of bar is above or below 1100° C. If

temperature is below 1100° C., Ti is rapidly etched from bar to form TiI_2, which through further reaction with TiI_4 is converted to TiI_3. Above 1100° C., TiI_4 is decomposed to Ti and I_2. When a tungsten bar is used, etching and deposition reactions of Ti are separated. (P13, Ti, W)

517-P. Permanent Magnets Increase Capacity and Life of Switch Contacts. R. B. Immel. *Machine Design,* v. 24, Sept. 1952, p. 132-138.

Addition of permanent magnets to the contacts on d.c. switches provide an effective arc blowout field and greatly increases their interrupting capacity. This eliminates necessity for additional contactors and relays normally required to handle the circuits of standard manual master switches. Data for various Alnico compositions are charted. (P16, SG-n, Al, Ni, Co)

518-P. The Gyromagnetic Ratios of the Ferromagnetic Elements. G. G. Scott. *Physical Review,* ser. 2, v. 87, Sept. 1, 1952, p. 697-699.

Gyromagnetic ratios for Fe, Co, and Ni were determined by means of a technique involving a sensitive torsional pendulum. Results on Ni and Co. Tables. (P16, Ni, Co, Fe)

519-P. Gyromagnetic Ratios of Iron, Cobalt, and Many Binary Alloys of Iron, Cobalt, and Nickel. S. J. Barnett and G. S. Kenny. *Physical Review,* ser. 2, v. 87, Sept. 1, 1952, p. 723-734.

Gyromagnetic ratios were determined by measurements on the Einstein-de Haas effect as made in the Norman Bridge Laboratory. Improvements were made in method of eliminating large quadrature torques, in method of reducing disturbances due to vibrations of building, in method of frequency control, in design of square wave commutator, and in design of rotors. Photographs, graphs, and tables. (P16, Fe, Co, Ni)

520-P. The Magnetic Properties of Superconducting Alloys of Indium and Thallium. W. F. Love, E. Callen, and F. C. Nix. *Physical Review,* ser. 2, v. 87, Sept. 1, 1952, p. 844-847.

Magnetization curves for spherical samples of a series of alloys in the solid solution range of Tl in In were measured as a function of temperature and composition, and critical field curves were obtained. Graphs. (P16, In, Tl)

521-P. The Spectroscopy of the Solid State: Copper and Chromium. E. M. Gyorgy and G. G. Harvey. *Physical Review,* ser. 2, v. 87, Sept. 1, 1952, p. 861-862.

M_{23} emission curves of Cu and Cr were obtained by using a vacuum recording spectrograph. Tabulated results. (P17, Cu, Cr)

522-P. Optical Polarization in Single Crystals of Tellurium. J. J. Loferski. *Physical Review,* ser. B, v. 87, Sept. 1, 1952, p. 905-906.

Transmission of Te crystals was observed in the infrared, and measured as a function of polarization of incident radiation relative to the C-axis of the crystal. Graphs present results. (P17, Te)

523-P. Neutron Total Cross Section for Lead Between 37 and 156 Mev. A. E. Taylor and E. Wood. *Physical Review,* ser. B, v. 87, Sept. 1, 1952, p. 907-908.

Method and results. (P10, Pb)

524-P. Size Effects in the Superconductivity of Cadmium. M. C. Steele and R. A. Hein. *Physical Review,* ser. B, v. 87, Sept. 1, 1952, p. 908.

Electrical and magnetic properties of matter below 1° K. Cd pellets were used. (P15, P16, Cd)

525-P. (French.) Contribution to the Study of the Conductivity of Silicon. Marcel Perrot and Jean Tortosa. *Comptes Rendus hebdomadaires des Seances de l'academie des Sciences,* v. 235, July 16, 1952, p. 143-145.

Conductivity of thin strips of Si prepared by thermal evaporation of a 98.75% Si thin film onto glass. Results are charted. (P15, Si)

526-P. (French.) Semiconductive Properties of Tellurium. Pierre Aigrain, Claude Dugas, Jacques Legrand des Cloizbeaux, and Bernard Jancovici. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 235, July 16, 1952, p. 145-146.

Properties and structure of a semiconducting Te monocrystal were studied by means of electric conductivity and Hall-effect measurements at various temperatures between that of liquid nitrogen and 50° C. (P15, Te)

527-P. (Book.) Industrial Magnetic Testing. N. S. Asprey. 132 pages. Mar. 1952. Institute of Physics, 47 Belgrave Square, London. S.W. 1, England. 25s.

Although this book contains a chapter entitled "Permanent Magnet Testing," it is not concerned with the design and use of thickness testers but rather with considerations involved in measurement of magnetic field strength. The whole book is theoretical rather than practical; designed for users who want to know how best to measure the performance of magnetic materials and to judge their suitability for particular applica-

tions. (From review in *Electroplating and Metal Finishing.)*
(P16, S13, S14)

528-P. (Book.) **Molybdenum Compounds; Their Chemistry and Technology.** D. H. Killeffer and Arthur Linz. 407 pages. 1952. Interscience Publishers, Inc., 250 Fifth Ave., New York 1, N. Y.

Includes a chapter on structural chemistry of Mo, by Linus Pauling. Third chapter is devoted to physical, chemical, and mechanical properties of Mo itself. The chapter on Mo catalysts occupies about half of the book by virtue of its extensive indexed catalyst bibliography.
(P general, Q general, Mo)

529-P. (Book.) **The Oxidation States of the Elements and Their Potentials in Aqueous Solutions.** Ed. 2. Wendell M. Latimer. 392 pages. 1952. Prentice-Hall, Inc., 70 Fifth Ave., New York 11, N. Y.

Summary of existing data. Present edition includes more extensive thermodynamic data of special significance in interpretation of inorganic chemistry; potential diagrams for all elements which have more than one oxidation state; several hundred new values; and amplified treatment of U, Np, Pu, Am, and the actinide elements. Footnote references, extensive tables, and study questions. (P12, P13)

530-P. Heat Conductivity of Superconductive Lead Below 1° K. J. L. Olsen and C. A. Renton. *Philosophical Magazine,* ser. 7, v. 43, Sept. 1952, p. 946-948.

Graphical data are presented.
(P11, Pb)

531-P. Interpretation of the de Haas-van Alphen Effect. L. Onsager. *Philosophical Magazine,* ser. 7, v. 43, Sept. 1952, p. 1006-1008.

Deals with magnetic susceptibilities of metals. (P16)

532-P. Magnetic Viscosity Under Discontinuously and Continuously Variable Field Conditions. R. Street, J. C. Woolley, and P. B. Smith. *Proceedings of the Physical Society,* v. 65, sec. B, Sept. 1, 1952, p. 679-696.

Apparatus, specimens of Fe, discontinuous field changes, continuously variable demagnetizing fields, and relation between magnetic viscosity and irreversible susceptibility. Diagrams and graphs.
(P16, Fe, SG-n, p)

533-P. Pile Neutron Absorption Cross Sections of Lead 206 and 207. K. L. Aitken, D. J. Littler, E. E. Lockett, and G. H. Palmer. *Proceedings of Physical Society,* v. 65, sec. A, Sept. 1, 1952, p. 761.

Mass spectrometer analyses and cross-section measurements of two samples of Pb. (P10, Pb)

534-P. The Deuteron Stripping Reaction With Aluminium. J. R. Holt and T. N. Marsham. *Proceedings of Physical Society,* v. 65, sec. A, Sept. 1, 1952, p. 763-764.

Reports results obtained with the reaction $^{27}Al(d, p)\ ^{28}Al$. Graphs.
(P10, Al)

535-P. The Thermal Accommodation Coefficient of Gases and Their Adsorption on Iron. A. E. J. Eggleton and F. C. Tompkins. *Transactions of the Faraday Society,* v. 48, Aug. 1952, p. 738-749.

Part of a general study of kinetics and thermodynamics of sorption of gases by pure Fe in which thermal accommodation coefficients of several gases at an Fe wire have been measured. Graphs and tables. 24 ref. (P13, Fe)

536-P. (English.) **An Investigation of the Validity of the Wiedemann-Franz-Lorenz Law.** J. O. Linde. *Arkiv För Fysik,* v. 4, no. 6, 1952, p. 541-554.

A critical investigation of the thermal conductivity of normal metals (Cu, Au, and Al) and Ag alloys. A formula is presented for the relation between thermal and electrical resistivity which takes into account the different behavior of the two parts of thermal resistivity of an alloy as regards their temperature dependence. Results are analyzed by above law. Graphs. 10 ref.
(P11, Cu, Au, Ag, Al)

537-P. (German.) **Theory on the Saturation Magnetism in Binary Ferromagnetic Alloys.** Hermann Statz. *Zeitschrift für Naturforschung,* v. 7a, Aug. 1952, p. 506-511.

Study of the electron structure of certain binary alloys and correlation with the saturation magnetization. Diagrams and graphs.
(P16, SG-n, p)

538-P. Dimensional Changes Normal to the Direction of Diffusion. R. W. Balluffi and B. H. Alexander. *Journal of Applied Physics,* v. 23, Sept. 1952, p. 953-956.

Measurements of dimensional changes normal and parallel to direction of diffusion in small wires and thin foils of Au into which Ag was diffused from the vapor. Diagram, tables, graph, and photomicrographs. 12 ref. (P10, N1, Au, Ag)

539-P. The Temperature Dependence of the Viscosity of Liquids. F. Gutmann and L. M. Simmons. *Journal of Applied Physics,* v. 23, Sept. 1952, p. 977-978.

Equation derived and its adequacy examined for literature data on a variety of liquids, organic and in-

organic, and the metals, Hg, Ga, K, and Na. 10 ref. (P10, Hg, Ga)

540-P. Field Emission From Tantalum in the Normal and Superconducting State. Robert Gomer and John K. Hulm. *Journal of Chemical Physics,* v. 20, Sept. 1952, p. 1500-1502.

Experimental procedure and results. Photograph of microscope assembly used. (P15, Ta)

541-P. The Free Energies of Formation of Tricalcium and Tetracalcium Phosphates. J. B. Bookey. *Journal of the Iron and Steel Institute,* v. 172, Sept. 1952, p. 61-66.

To increase knowledge of P-O equilibria the reduction equilibria of tricalcium and tetracalcium phosphates with hydrogen were studied in the range 1250-1550° C., and results used to calculate free-energy changes involved in reactions of solid CaO and gaseous oxygen and phosphorus and in that of the solution of gaseous phosphorus in liquid iron. Apparatus diagram and tables. 14 ref. (P12, Fe)

542-P. The Free Energy of Formation of Magnesium Phosphate. J. B. Bookey. *Journal of the Iron and Steel Institute,* v. 172, Sept. 1952, p. 66-68.

A study in relation to complex dephosphorizing slags. Reduction equilibrium of Mg orthosphosphate with H was studied in range 1000-1250° C., and results used to calculate above. 12 ref. (P12, B21)

543-P. Thermodynamic Properties of Silicon Monoxide; an Experimental Study of the Equilibria $SiO_2 + Si = 2SiO$ and $SiO_2 + H_2 = SiO + H_2O$. N. C. Tombs, A. J. E. Welch. *Journal of the Iron and Steel Institute,* v. 172, Sept. 1952, p. 69-78.

A study of the above in the range 1200-1650° C. Significance to steelmaking. Tables. 25 ref. (P12, B21)

544-P. Infrared Absorption in High Purity Germanium. H. B. Briggs. *Journal of the Optical Society of America,* v. 42, Sept. 1952, p. 686-687.

Results of measurements of extinction coefficients for high purity single-crystal Ge in region of fundamental absorption limit which may be used to predict performance near cut-off range of optical filters of various thicknesses. Typical transmission curves for range 2-25μ are included. Graphs. (P17, Ge)

545-P. Silver Films and Dielectric Multiple Films in Interferometry. D. A. Jackson and K. Kuhn. *Nature,* v. 170, Sept. 13, 1952, p. 455-456; disc., p. 456.

Brief critical report on work done by A. H. Jarrett and H. v. Klüber, followed by a short discussion by A. H. Jarrett in which he mentions some of his recent experimental results. (P17, T8, Ag)

546-P. Russell Effect on Evaporated Metal Films. L. Grunberg and K. H. R. Wright. *Nature,* v. 170, Sept. 13, 1952, p. 456-457.

Experimental data. Effect is that freshly abraded metal surfaces produce an image on photographic plates. (P17)

547-P. Effect of Minority Carriers on the Breakdown of Point Contact Rectifiers. Ernst Billig. *Physical Review,* ser. 2, v. 87, Sept. 15, 1952, p. 1060-1061.

On the application of short high-voltage pulses to point contact rectifiers in the inverse direction, thermal instability of Ge and Se is observed. Intrinsic conduction due to the thermal generation of electron-hole pairs and the subsequent passage of minority carriers is suggested as the cause of electrical breakdown. 10 ref. (P15, Ge, Se)

548-P. The Resistivity of Cu_3Au During Neutron Irradiation. H. L. Glick, F. C. Brooks, W. F. Witzig, and W. E. Johnson. *Physical Review,* ser. 2, v. 87, Sept. 15, 1952, p. 1074.

Samples of initially ordered and disordered Cu_3Au were irradiated in a nuclear reactor at 80° C. Continuous electrical resistivity measurements suggested that pile irradiation has both ordering and disordering tendencies. (P15, Cu, Au)

549-P. Mobility of Electrons in Germanium. P. P. Debye and E. M. Conwell. *Physical Review,* ser. 2, v. 87, Sept. 15, 1952, p. 1131-1132.

Measurements were made, at room temperature, on a number of Ge samples in various conductivity ranges which yielded higher mobilities than any previously found. In range of resistivity for which drift mobility values are available, new values substantially agree with drift mobility values measured by Haynes. (P15, Ge)

550-P. Superconductivity Below 1° K. M. C. Steele. *Physical Review,* ser. 2, v. 87, Sept. 15, 1952, p. 1137-1138.

Experiments for studying critical magnetic curves for Ru and Cd. Graphs. (P16, Ru, Cd)

551-P. Interpretation of the Low Temperature Hall Curve of a Degenerate Germanium Sample. D. M. Finlayson, V. A. Johnson, and F. M. Shipley. *Physical Review,* ser. 2, v. 87, Sept. 15, 1952, p. 1141-1142.

Graphs and table. (P15, Ge)

552-P. Theoretical and Experimental Heat Capacities of Superconducting Metals. R. W. Worley, W. M. Zemansky, and H. A. Boorse. *Physical Re-*

view, ser. 2, v. 87, Sept. 15, 1952, p. 1142-1143.

Results of their experiments compared with those of previous investigations. Metals studied were V, Cb, Ta, La, In, and Sn. Graphs. 11 ref. (P15, V, Cb, Ta, La, In, Sn)

553-P. Nitrogen in Metals. David O. Caldwell. *Review of Scientific Instruments*, v. 23, Sept. 1952, p. 501-502.

Nitrogen activities in several metals were investigated using the UCLA 41-in. synchrocyclotron. Graph. (P12)

554-P. The Mechanism of Hydrogen Evolution at Copper Cathodes in Aqueous Solutions. J. O'M. Bockris and N. Pentland. *Transactions of the Faraday Society*, v. 48, Sept. 1952, p. 833-839.

Application to Cu cathodes on which no work in purified solutions is recorded. Tables and graphs. 23 ref. (P15, Cu)

555-P. Copperweld Fine Wire. F. E. Leib. *Wire and Wire Products*, v. 27, Sept. 1952, p. 878-880, 927.

Physical and mechanical properties and applications as a fine wire conductor.
(P general, Q general, T1, ST, Cu)

556-P. (English.) **The Influence of Elastic Shear Strains on the Conductivity and Thermo-Electric Force of Cubic Metals.** J. Smit. *Physica*, v. 18, Aug.-Sept., 1952, p. 587-596.

Influence which elastic shear strains have on shape of Fermi surface of metals and on electrical conductivity. Thermal e.m.f. was calculated for monovalent f.c.c. metals, and results were compared with experimental values for Cu, Ag, and Au. 12 ref. (P15, Q21, Cu, Ag, Au)

557-P. (English.) **On the Behaviour of an Electrically Conductive Liquid in a Magnetic Field.** Bo Lehnert. *Arkiv för Fysik*, v. 5, no. 1-2, 1952, p. 69-90.

Theoretical discussion, and experimental data for mercury.
(P15, P16, Hg)

558-P. (English.) **Experimental Researches on "Wetting Effect" and "Liquostriction".** Carl Benedicks and Robert Härden. *Arkiv för Fysik*, v. 3, nos. 4-5, 1952, p. 407-440.

Considers new experiments regarding wetting effect on various substances together with theoretical points of view regarding the concept of surface tension. Also gives experimental data on effect of liquostriction — the expansion effect caused by intimate contact of a liquid with a solid body. Includes sections relating to both metals and nonmetals. (P10)

559-P. (English.) **Determination of the Alpha-Energy of U^{235}.** R. Vestergaard and E. Haeffner. *Arkiv för Fysik*, v. 3, no. 6, 1952, p. 557-575.

Experimental details and data. Circuit diagrams and graphs. 21 ref. (P10, U)

560-P. The Viscosity of Molten Tin, Lead, Zinc, Aluminium, and Some of Their Alloys. T. P. Yao and V. Kondic. *Journal of the Institute of Metals*, v. 81, Sept. 1952, p. 17-24.

Previous work as well as experimental research by the author. The apparatus employed was such that both the rotating-crucible and oscillating-pendulum methods could be employed. Oscillograms, tables, and schematic diagram of the viscometer. 11 ref. (P10, Sn, Pb, Zn, Al)

561-P. Magnetic Susceptibilities of Palladium-Rhodium Alloys From 20°-300° K. F. E. Hoare, J. S. Kouvelites, and J. C. Matthews. *Nature*, v. 170, Sept. 27, 1952, p. 537-538.

Possibilities of increasing the number of holes in the *d*-band by alloying small amounts of an appropriate metal (rhodium or silver) with palladium. (P16, Pd)

562-P. A New Gyromagnetic Effect in Permalloy and Iron. S. J. Barnett and Louis A. Giambomi. *Physical Review*, ser. 2, v. 88, Oct. 1, 1952, p. 28-37.

Reviews previous work and theory involved. Describes experiments. Diagrams and graphs. 10 ref.
(P16, Ni, Fe)

563-P. Radiation Damage and Recovery in Cu, Ag, Au, Ni, and Ta. J. W. Marx, H. G. Cooper, and J. W. Henderson. *Physical Review*, ser. 2, v. 88, Oct. 1, 1952, p. 106-112.

Electrical resistivity changes induced by 12-Mev. deuteron bombardment of Cu, Ag, Au, Ni, and Ta foils were determined as functions of integrated flux. Bombardments were carried out at about −140 and −150° C., and differences in the two sets of measurements were traced to a thermal recovery process. It is suggested that migration of vacancy pairs offers a reasonable model for initial recovery process, although other mechanisms are also discussed. Diagrams, tables, and graphs. 16 ref.
(P13, Cu, Au, Ag, Ni, Ta)

564-P. A New Photographic Method of Measuring the Dispersion of the Optical Constants of Metals. J. Bor. *Proceedings of the Physical Society*, v. 65, sec. B, Oct. 1, 1952, p. 753-758.

Dispersion is determined on a photographic plate as a vertical band of variable intensity for each wavelength and is compared microphotometrically with an adjacent band of graded intensity produced by same wavelength. Diagrams. (P17)

565-P. The Absorption of Light By Noble Metals and Its Relation to the van der Waals Contribution to the Cohesive Energy. J. Friedel. *Proceedings of the Physical Society,* v. 65, sec. B, Oct. 1, 1952, p. 769-774.

Theoretical analysis. Diagrams and tables. 20 ref. (P17, EG-c)

566-P. The Optical Constants of Thin Metallic Films Deposited by Evaporation. P. L. Clegg. *Proceedings of the Physical Society,* v. 65, sec. B, Oct. 1, 1952, p. 774-781.

Optical properties of evaporated films of Ag, Au, Sn, and In were determined by a photo-electric method. Influence of factors concerned with evaporation procedure was investigated in case of Ag films. Application of Maxwell Garnett's theory shows qualitative agreement with experimental values. Graphs. 10 ref. (P17, L25, Ag, Au, Sn, In)

567-P. Universal Skin-Effect Chart for Conducting Materials. Harold A. Wheeler. *Electronics,* v. 25, Nov. 1952, p. 152-154.

Skin depth, napier depth, and depth of penetration of current in various nonmagnetic and nonferrous metals, solutions, and ground at frequencies ranging from 1 cps. to 1,000,000 mc. Graph and tables. 16 ref. (P15, EG-a)

568-P. The Heat Capacity of Gallium From 15 to 320° K. The Heat of Fusion at the Melting Point. George B. Adams, Jr., Herrick L. Johnson, and Eugene C. Kerr. *Journal of the American Chemical Society,* v. 74, Oct. 5, 1952, p. 4784-4787.

Measurements were made on five samples of Ga over above range. A table of thermodynamic functions was prepared for Ga at smoothed values of temperatures. Tables. 14 ref. (P12, Ga)

569-P. The Vapor Pressure of Germanium. Alan W. Searcy. *Journal of the American Chemical Society,* v. 74, Oct. 5, 1952, p. 4789-4791.

Determined over the 1510-1882° K. range by the Kundsen effusion method. Tables. 19 ref. (P12, Ge)

570-P. Contact Resistance. Wm. B. Kouwenhoven and Clarence W. Little. *Welding Journal,* v. 31, Oct. 1952, p. 457s-465s.

Laws that apply to resistance offered by electric contacts used in resistance welding and in electric circuits. Metals used in investigation were Al, brass, bronze, Ag, and stainless. Photomicrographs, diagrams, and graphs.
(P15, K3, Al, Cu, Ag, SS)

571-P. Selection and Processing of Chromium-Nickel Stainless Steels for Magnetic Applications. F. K. Bloom and J. S. White. *Wire and Wire Products,* v. 27, Oct. 1952, p. 1036-1038, 1126-1127.

Effect of chemical composition and processing on magnetic properties of Cr alloy and Cr-Ni alloy steels. Processing refers largely to the wiredrawing operation.
(P16, F28, SS)

572-P. (French.) **The Ferromagnetism of Certain Gadolinium-Magnesium Alloys.** Francoise Gaume-Mahn. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 235, Aug. 4, 1952, p. 352-354.

Results on alloys which the amount of Gd exceeds 68%. Graph. (P16, Gd, Mg)

573-P. (French.) **The Magnetic Behavior of Rhenium Associated With Palladium.** Jules Wucher and Nicholas Perakis. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 235, Aug. 11, 1952, p. 419-421.

Experimental results of a thermomagnetic study of the Re-Pd system. (P16, Re, Pd)

574-P. (French.) **Thermo-Electric Measurements on Silicon P.** Jean Savornin and France Savornin. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 235, Aug. 18, 1952, p. 465-468.

Emf. of thermocouples consisting of a Si bar plus a Cu wire was measured. The Si used is positive in relation to the Cu; the thermoelectric power in relation to the Cu is 700 MV. per degree, for 99.85% purity. (P15, Cu, Si)

575-P. (French.) **Thermal Conductivity. Its Importance to the Behavior of Heat-Resistant Materials.** M. Pommellet. *Métaux: Corrosion—Industries,* v. 27, July-Aug. 1952, p. 318-324.

Possibilities of theoretical calculation, and of practical utilization of the method in nonisotropic media. (P11, SG-h)

576-P. (French.) **Influence of Sulfur on the Properties of Cementite.** J. Drain and A. Michel. *Revue de Métallurgie,* v. 49, Aug. 1952, p. 585-588; disc., p. 589.

Experimental arrangement for the investigation. The influence of sulfur on Curie point, stability, and rate of the austenitic-ferritic transformation. Diagrams. 11 ref.
(P16, N8, ST)

577-P. (German.) **Semiconducting Properties of Intermetallic Compounds (CdSb).** Eduard Justi and Günter Lautz. *Abhandlungen der Braunschweigischen Wissenschaftlichen Gesellschaft,* v. 4, 1952, p. 107-116.

Tabulated data, charts, and references. (P15, Cd, Sb)

578-P. (German.) **Research on the Occurrence of Separate Processes in Magnetostriction.** Eduard Bailitis, Curt Hagen, and Hans Heinrich Rust. *Zeitschrift für Angewandte Physik,* v. 4, Aug. 1952, p. 284-291.

Reversible and irreversible processes in magnetostriction. Magnetostriction is composed of different distinct processes. Investigation reveals three processes which vary with remanence and coercive force of the material. Data for several magnetic metals and alloys. 11 ref. (P16, SG-n)

579-P. (German.) **Mechanism of Resistance Change in a Magnetic Field.** A. Nedoluha and K. M. Koch. *Zeitschrift für Physik,* v. 132, Aug. 1952, p. 608-620.

A new diagram for conductors of complex conduction mechanism, especially alloys, is shown to explain the above more clearly than customary models of the electron theory. Diagrams. 10 ref. (P15)

580-P. (Russian.) **The Specific Catalytic Activity of Metallic Platinum.** V. S. Chesalova and G. K. Boreskov. *Doklady Akademii Nauk SSSR,* new ser., v. 85, July 11, 1952, p. 377-379.

A study was made of the specific activity of Pt prepared by different methods and having different specific surfaces. (P13, Pt)

581-P. Thermodynamic Properties of the Liquid Ternary System Bismuth-Cadmium-Tin. Svante Mellgren. *Journal of the American Chemical Society,* v. 74, Oct., 20, 1952, p. 5037-5040.

Activity of cadmium in liquid Bi-Cd-Sn alloys was determined with aid of e.m.f. measurements. From these values, integral molar excess free energy and partial molar excess free energies of all components were calculated. Tables and graphs. (P12, Bi, Cd, Sn)

582-P. Principles Involved in the Formation of Iron Alloys. K. W. Andrews. *Metal Treatment and Drop Forging,* v. 19, Oct. 1952, p. 425-432.

Develops a number of empirical relationships. Includes study of experimental facts to deduce principles of classification, semiquantitative study of diagrams from a thermodynamic viewpoint, and explanation of formation of alloys and their constitution and properties in terms of modern electronic theory of atomic structure. Graphs and diagrams. 24 ref. (P12, M25, Fe)

583-P. Superconductivity of Rhenium. J. G. Daunt and T. S. Smith. *Physical Review,* ser. 2, v. 88, Oct. 15, 1952, p. 309-311.

Report on measurements made in the liquid helium temperature region of the magnetic threshold curve of Re by observations of magnetic moment of powdered samples. Graphs and tables. 14 ref. (P15, P16, Re)

584-P. The Superconductive Transition in Tantalum. H. Preston-Thomas. *Physical Review,* ser. 2, v. 88, Oct. 15, 1952, p. 325-327.

Use of small coreless coils allows simultaneous measurement of resistive and magnetic transitions in Ta. Results are explained on basis of a modification of a two-phase model and critical field-temperature curves are derived for bulk metal and for filament material. Graphs. (P15, P16, Ta)

585-P. Mean Free Paths of Electrons in Evaporated Metal Films. F. W. Reynolds and G. R. Stilwell. *Physical Review,* ser. 2, v. 88, Oct. 15, 1952, p. 418-419.

Determination using thin films of Cu and Ag. Compares measured and calculated resistance - temperature coefficients. (P15, M25, Cu, Ag)

586-P. Sensitive Recording Alternating-Current Hall Effect Apparatus. E. M. Pell and R. L. Sproull. *Review of Scientific Instruments,* v. 23, Oct. 1952, p. 548-552.

Apparatus which will measure mobilities of the order of 10^{-2} sq. cc. per volt-sec. in semiconductors, and is especially suited for measuring Hall voltage in samples of very low conductivity. (P15)

587-P. Some Studies on the Behaviour of Metals and Alloys at Elevated Temperatures Under Vacuum. W. Baukloh and G. P. Chatterjee. *Transactions of the Indian Institute of Metals,* v. 4, 1950, p. 239-252; disc., p. 252-254.

Behavior of α-β brass when heated in vacuum at different temperatures for different periods of time. It was found that, when a piece of polished unetched brass is heated under vacuum, Zn volatilizes from grain boundaries at a faster rate than from the grains, resulting in vacuum etching which occurs at different temperatures depending on time and amount of cold reduction. Loss of weight due to volatilization was found to be a function of temperature, time, surface area, and amount of cold rdeuction. (P12, Cu)

588-P. (German.) **Standard Resistors of Gold-Chromium Alloy.** A. Schulze and H. Eicke. *Zeitschrift für Angewandte Physik,* v. 4, Sept. 1952, p. 321-324.

Demand for greater accuracy in electrical measuring led to development of Au-Cr alloys to replace

manganin. Different designs of Au-Cr alloy resistors. Data are tabulated. (P15, T1, Au)

589-P. (German.) **Perturbance Conductivity and Semiconductivity of Intermetallic Compounds. II.** E. Justi and G. Lautz. *Zeitschrift für Naturforschung,* v. 7a, Sept. 1952, p. 602-613.

Effect of temperature on electrical conductivity resistance change in a magnetic field, differential thermoelectric force, and rectifying properties of CdSb. Results show that stoichiometric CdSb is an intrinsic semiconductor. Graphs, diagrams, and tables. 17 ref. (P15, Cd, Sb)

590-P. The Heat of Combustion of Neodymium. Elmer J. Huber, Jr., and Charles E. Holley, Jr. *Journal of the American Chemical Society,* v. 74, Nov. 5, 1952, p. 5530-5531.

Investigation of the heats of formation of rare-earth oxides from which the metals can be obtained, specifically work on Nd. (P12, Nd, EG-g)

591-P. Solid State Physics in Electronics and in Metallurgy. W. Shockley. *Journal of Metals,* v. 4, Aug. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 829-842.

Urges that metallurgical industry support fundamental research on dislocations in their own laboratories and in universities. Experience of the author is drawn largely from two fields in solid-state physics —transistor electronics and dislocation theory, and their relationship. Some new results exhibit features of dislocations with a clarity comparable to that achieved for holes and excess electrons in semiconductors. Experimental examples are concerned with growth spirals, grain-boundary energies, strength of small metal crystals, and surface hardening of Al crystals. Numerous diagrams and illustrations. 28 ref. (P12, P15, M26)

592-P. Thermal Buckling of Plates. Myron L. Gossard, Paul Seide and William M. Roberts. *National Advisory Committee for Aeronautics,* Technical Note 2771, Aug. 1952, 39 pages.

Approximate method, based on large-deflection plate theory, for calculating deflections of flat or initially imperfect plates subject to thermal buckling. This method was used to determine deflections of a simply supported 75S-T6 Al-alloy panel subjected to a tentlike temperature distribution over the plate surface. Schematic diagrams and tables. (P11, Al)

593-P. Photon Absorption Cross Sections in Bismuth and Tantalum. J. Halpern, R. Nathans, and A. K. Mann. *Physical Review,* ser. 2, v. 88, Nov. 1, 1952, p. 679-680.

Measured by a method of delayed neutron detection. 11 ref. (P10, Bi, Ta)

594-P. Properties of Silicon and Germanium. Esther M. Conwell. *Proceedings of the I.R.E.,* v. 40, Nov. 1952, p. 1327-1337.

Latest experimental information on those fundametal properties of Ge and Si which are of device interest, currently or potentially. Electrical properties, especially carrier density and mobility; detail; physical background. Tables and graphs. 50 ref. (P15, Si, Ge)

595-P. The Temperature Variations of the Magnetization of Nickel in Low and Moderate Fields. R. S. Tebble, J. E. Wood, and J. J. Florentin. *Proceedings of the Physical Society,* v. 65, sec. B, Nov. 1, 1952, p. 858-871.

Results of measurements of reversible changes in magnetization accompanying changes in temperature in annealed Ni. Results in relation to work of Bates and others on temperature changes produced by adiabatic changes in magnetization (the magnetocaloric effect). Graphs. 13 ref. (P17, Ni)

596-P. Antiferromagnetism and Ferrimagnetism. Louis Neel. *Proceedings of the Physical Society,* v. 65, sec. A, Nov. 1, 1952, p. 869-885.

Present knowledge of antiferromagnetism, including ferrimagnetism. Some phenomena concerning magnetic behavior of certain ferrites and of pyrrhotite. Graphs and diagrams. 32 ref. (P17, SG-n, p)

597-P. The Effect of Temperature of Deformation on the Electrical Resistivity of Cold-Worked Metals and Alloys. T. Broom. *Proceedings of the Physical Society,* v. 65, sec. B, Nov. 1, 1952, p. 871-881.

Apparatus used to draw wires of Al, Cu, Ni, Fe, 50-50 Ag-Au, 75-25 brass, and Ag_3Mg at temperatures between −183 and 100° C., and to measure their resistances at the temperature of drawing. Results suggest that a unified theory of effect of deformation on resistivity of both pure metals and alloys can be based on stacking faults. Graphs and tables. 22 ref. (P15, Al, Cu, Ni, Fe, Ag, Au, Mg)

598-P. Spin Degeneracy and the Theory of Collective Electron Ferromagnetism. A. B. Lidiard. *Proceedings of the Physical Society,* v. 65, sec. A, Nov. 1, 1952, p. 885-893.

Theoretical analysis with application to Fe, Co, and Ni. 15 ref. (P17, Fe, Co, Ni)

599-P. A Critical Study of the Asymmetrical Temperature Gradient Thermoelectric Effect in Copper and Platinum. N. Fuschillo. *Proceedings of the Physical Society,* v. 65, sec. B, Nov. 1, 1952, p. 896-904.

Proves a rigorous test of existence of above by correlating effects produced by symmetrical gradients with those produced by gradients of pronounced asymmetry at both high and low temperatures and at many points along considerable lengths of wire. Attention was paid to elimination of strain, impurity, and hidden sources of error. Means of reducing inhomogeneity effects in Cu wires. Graphs. 12 ref. (P15, Cu, Pt)

600-P. Resistance of Germanium Contacts. J. B. Gunn. *Proceedings of the Physical Society,* v. 65, sec. B, Nov. 1, 1952, p. 908-909.

Brief theoretical analysis. (P15, Ge)

601-P. Ferromagnetism. Ursula M. Martins. "Progress in Metal Physics. Vol. 3" (Interscience Publishers, New York), 1952, p. 140-175.

Effect of location in periodic table, saturation magnetization, energy relationship in ferromagnetic crystals, domain configurations, theories of coercive force, polycrystalline materials, and ferromagnetic permeability. Diagrams, graphs, and micrographs. 64 ref. (P17, SG-n, p)

602-P. Properties of Metals at Low Temperatures. K. C. MacDonald. "Progress in Metal Physics. Vol. 3" (Interscience Publishers, New York), 1952, p. 42-75.

Summarizes recent progress in observation of fundamental electrical and thermal properties, primarily in low-temperature region. Specific heats and electrical conductivity in particular. Graphs and tables. 137 ref. (P11, P12, P15)

603-P. (Book.) **Mixtures. The Theory of the Equilibrium Properties of Some Simple Classes of Mixtures, Solutions, and Alloys.** E. A. Guggenheim. 270 pages. 1952. Oxford University Press, Amen House, Warwick Sq., London E.C. 4, England.

Applies statistical thermodynamics to certain models of solid, liquid, and gaseous mixtures. Includes chapters on classical and statistical thermodynamics of mixtures; ideal, regular, and dilute solutions; lattice imperfections; superlattices; athermal and non-athermal mixtures; and macromolecular solutions. (P12, M26)

604-P. (Book.) **Progress in Metal Physics. Vol. 3.** Bruce Chalmers, editor. 334 pages. 1952. Interscience Publishers, 250 Fifth Ave., New York 1. $8.00.

Reviews of present state of knowledge in specialized aspects of physical metallurgy and metal physics, by various authors. Each of the eight articles is separately abstrated. (P general, N general)

SECTION Q

MECHANICAL PROPERTIES and TEST METHODS; DEFORMATION

1-Q. Recent Contributions to the Theory of Plasticity. William Prager. *Applied Mechanics Reviews,* v. 4, Nov. 1951, p. 585-588.

A review. Numerous references. (Q23)

2-Q. The Form of an Aluminium Alloy Angle for Use as a Strut. C. G. Watson. *Engineer,* v. 192, Oct. 19, 1951, p. 482-485.

Design of an Al-alloy angle section giving greatest economy of material when used as a strut. The alloy used is Noral 51S-T. Its stress-strain relationship is shown graphically. From this is derived a graph in which stress is related to tangential modulus of elasticity; and from this, the Euler curve is constructed. (Q23, Al)

3-Q. Brittle Fracture of Mild Steel. T. S. Robertson. *Engineering,* v. 172, Oct. 5, 1951, p. 445-448.

Previously abstracted from *Engineer.* See item 608-Q, 1951. (Q23, ST)

4-Q. ML Aluminium Alloy; A Material for Elevated Temperatures. J. C. McGee. *Foundry,* v. 79, Dec. 1951, p. 112-113, 195.

See abstract of "ML Aluminum Casting Alloy—A Material for Elevated Temperatures," *CADO Technical Data Digest,* item 453-Q, 1951. (Q general, Al, SG-h)

5-Q. Factors Affecting the Quality of Cast Steel. T. N. Armstrong. *Foundry,* v. 79, Dec. 1951, p. 114-117, 207-208.

Effect of additions on mechanical properties is stressed. Micrographs and graphed and tabulated data. (Q general, E25, CI)

6-Q. Arc-Cast and Powdered Molybdenum Tested. J. H. Bechtold and Howard Scott. *Iron Age,* v. 168, Nov. 22, 1951, p. 92-95.

Unalloyed Mo has good ductility but becomes brittle at temperatures not much below freezing. Tensile and creep strengths at high temperature are low. Predicts that while further research should lead to useful alloys, molybdenum-base gas-turbine blades are unlikely. 11 ref. (Q23, T25, Mo)

7-Q. Measurement of the Distribution of Tensile and Bond Stresses Along Reinforcing Bars. R. M. Mains. *Journal of the American Concrete Institute,* v. 23, Nov. 1951; *ACI Proceedings,* v. 48, 1951, p. 225-252.

Tensile and bond stresses were measured along reinforcing bars by a new technique which does not disturb bond stresses. Curves for representative beam and pull-out specimens show tensile-force distribution, bond-stress distribution, applied moment vs. measured bar tension, comparison of beam and pull-out tensile-force distribution, and applied load vs. slip of the bar. Comparison of ordinarily calculated bond with measured local maximum values shows the calculated values to be frequently less than one-half the values measured in these tests. Evidence shows that cracks in beams decisively affect magnitude and distribution of tensile and bond stresses. (Q25, Q27, CN)

8-Q. Recent Progress in the Plastic Methods of Structural Analysis. P. S. Symonds and B. G. Neal. *Journal of the Franklin Institute,* v. 252, Nov. 1951, p. 383-407.

Recent developments in methods of plastic failure analysis based on certain simple hypotheses as to the carrying capacity of flexural members. The basic hypotheses are first defined and a simple example is given to illustrate their use. Certain physical assumptions are made concerning the carrying capacity of flexural members of mild steel. 19 ref. (Q25, ST)

9-Q. Slip Bands and Hardening Processes in Aluminium. A. F. Brown. *Journal of the Institute of Metals,* v. 80, Nov. 1951, p. 115-124.

Slip bands in Al increase in num-

ber during plastic deformation and, at the same time, further slip occurs within each band. At higher temperatures and lower rates of deformation, as well as with increasing strain under all conditions, the latter process becomes increasingly predominant. This is interpreted on the basis of the fine structure of slip bands resolved by the electron microscope. Differences in density and inner structure of slip bands formed under different conditions are compared with differences between stress-strain curves. (Q24, Al)

10-Q. The Creep and Softening Properties of Copper for Alternator Rotor Windings. N. D. Benson, J. McKeown, and D. N. Mends. *Journal of the Institute of Metals*, v. 80, Nov. 1951, p. 131-142.

Resistance to creep of a number of high-conductivity coppers was investigated in the range 130-225° C. Softening characteristics were also determined over the same temperature range. Creep resistance and resistance to softening were shown to be very much greater for Ag-bearing (0.1% Ag) than for Ag-free, tough-pitch Cu. Creep resistance and resistance to softening of OFHC Cu are greater than those of tough-pitch coppers when both are Ag-free. Ag-bearing (0.1%) OFHC and tough-pitch coppers have similar resistances to creep and softening. 12 ref. (Q3, Cu)

11-Q. An Investigation of the Structural Changes Accompanying Creep in a Tin-Antimony Alloy. W. Betteridge and A. W. Franklin. *Journal of the Institute of Metals*, v. 80, Nov. 1951, p. 147-150.

A Sn + 5% Sb alloy was used for a microscopical study of phenomena occurring during creep at room temperature. In addition to general slip within the grains and flow at the grain boundaries, it is shown that localized strain within the grains occurs in directions associated with boundaries between adjacent grains. It is also suggested from this work, and from an examination of a pure Al sample strained in creep at 250° C., that the "cell structure" observed by X-ray examination is a result of the break-up of the grains by slip bands and by local strains. 10 ref. (Q3, Sn, Al)

12-Q. Discussion of the Paper—"The Effect of Cold-Work on Steel," J. H. Andrew, H. Lee, and others. *Journal of the Iron and Steel Institute*, v. 169, Oct. 1951, p. 133-136.

Paper published in v. 165, June 1950, and Aug. 1950. See item 460-Q, 1950. (Q23, P15, ST)

13-Q. Tensile and Impact Properties of Iron and Some Iron Alloys of High Purity. W. P. Rees, B. E. Hopkins, and H. R. Tipler. *Journal of the Iron and Steel Institute*, v. 169, Oct. 1951, p. 157-168.

Tensile and impact properties of high-purity Fe and Fe-Mn, Fe-C, and Fe-C-Mn alloys, at various temperatures covering the tough to brittle transition. Technique used to carry out tests at low temperatures. Two types of brittleness, intergranular and cleavage, can occur in iron. Evidence indicates that oxygen is effective in promoting intergranular brittleness. It is also affected either by grain size or by some other factor resulting from the treatment used to obtain coarse grains. (Q23, Q27, Q6, Fe)

14-Q. Canadian Progress in Magnesium Extrusion Alloys. H. G. Warrington. *Modern Metals*, v. 7, Nov. 1951, p. 23-27.

By using high-purity metal made by the ferrosilicon process, the Canadians claim to have achieved a better combination of properties in wrought Mg alloys. During the past few years, Dominion Magnesium Limited has been conducting a program designed to simplify the range of wrought Mg alloys while achieving higher mechanical properties and good workability. The new Zn-Zr alloy, ZK61, has figured prominently in this program. (Q general, Mg)

15-Q. A Survey of Creep in Metals. A. D. Schwope and L. R. Jackson. *National Advisory Committee for Aeronautics*, Technical Note 2516, Nov. 1951, 66 pages.

Summarizes numerous theories relating to creep phenomena and the extent of current knowledge on the subject. Various possible mechanisms by which creep occurs both in single crystals and in polycrystals. 199 ref. (Q3)

16-Q. Testing Hot Metal Ladles. K. E. Knudsen, W. H. Munse, and B. G. Johnson. *Proceedings of the Society for Experimental Stress Analysis*, v. 9, no. 1, 1951, p. 11-18.

Strains were measured with SR-4 electric strain gages, and deflections by means of deflection dials reading to 1/1000 in. (Q25)

17-Q. Some Unorthodox Procedures in Photoelasticity. A. J. Purelli and Rex L. Lake. *Proceedings of the Society for Experimental Stress Analysis*, v. 9, no. 1, 1951, p. 97-122.

A diffused light polariscope and some simplified techniques which, it is hoped, will make possible the production of stress patterns of reasonably good quality by those who have neither the time nor the in-

clination to develop the skills required by conventional methods. Creep properties in photo-formaldehyde plastics; use in 2-3 dimensional photo-elasticity. 10 ref. (Q25)

18-Q. Characteristics of Wire Gages Under Various Conditions. Harry Majors, Jr. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 1, 1951, p. 123-139, disc., p. 139-140.

An experimental program in which the variation of gage sensitivity from −310 to 140° F. is reported for wire gages type A-3 and A-15 mounted on steel and Constantan beams, respectively. 52 ref. (Q25, ST)

19-Q. Characteristics of Electric Strain Gages at Elevated Temperatures. Emmett E. Day. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 1, 1951, p. 141-150.

Results of a test in which the gage factor was checked against temperature for 21 commonly used commercial SR-4 strain gages. (Q25)

20-Q. An Optical Strain Gage for Use at Elevated Temperatures. P. R. Weaver. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 1, 1951, p. 159-162. (TG265 So13p)

An optical gage capable of operating at temperatures up to 500° F. It was designed and developed at the National Bureau of Standards for use in determining mechanical properties and for evaluating the performance of remote-reading strain gages at high temperatures. (Q25)

21-Q. Development and Use of High-Temperature Strain Gages. R. E. Gorton. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 1, 1951, p. 163-176.

Applications to engines. Various performance factors. (Q25)

22-Q. Resistance Wire Strain Gages in Product Development. W. H. Buckley and R. G. Anderson. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 1, 1951 p. 177-190.

Some applications of Baldwin SR-4 resistance-wire strain gages in product-development engineering, as well as some suggested methods and limitations in their use. (Q25)

23-Q. A Wire Resistance Strain Gage for the Measurement of Static Strains at Temperatures up to 1600° F. J. E. Carpenter and L. D. Morris. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 1, 1951, p. 191-200.

The application of high-temperature, wire-resistance strain gages to static testing. Techniques and apparatus used in fabricating and instrumenting the gage. The gage properties and some test results obtained by its use. (Q25)

24-Q. A Combined Stress Test Machine for Evaluating Heat-Resistant Alloys. William Foster. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 1, 1951, p. 211-220. (Q25, SG-h)

25-Q. A Realistic Approach to the Use of Titanium. Herman H. Hanink. *Product Engineering,* v. 22, Nov. 1951, p. 164-171.

Experimental work undertaken to determine mechanical properties of certain hot rolled and annealed alloys; effect of heat treatment on these properties; the difference in properties between forged parts and test-bar specimens; and behavior of machined Ti components subject to dynamic loading under simulated engine operating conditions. (Q general, Ti)

26-Q. Five Ways to Use Bonded-Wire Strain Gages. *SAE Journal,* v. 59, Nov. 1951, p. 28-29. (Excerpts from "Methods for Evaluating Loads and Stresses for Machine Design" by F. G. Tatnall.) (Q25)

27-Q. Many Ramifications of Wear Problem Discussed. V. A. Crosby. *SAE Journal,* v. 59, Nov. 1951, p. 30-31.

A survey on wear problems. Wear resistance of parts as related to the structure, hardness, and heat treatment of gray iron is stressed. (Q9, CI)

28-Q. Tests for SAE Grade 5 Bolts. A. S. Jameson. *SAE Journal,* v. 59, Nov. 1951, p. 54-59.

An investigation made to determine possible advantages in the use of torsion testing over tensile testing for the evaluation of bolts. Properties measured (proportional limit, torsional shear and degrees twist), correspond roughly to the three tensile properties: yield strength, tensile strength, and total elongation. (Q27, Q1, CN)

29-Q. The Fatigue Strength of Threaded Connections. R. C. A. Thurston. *Transactions of the American Society of Mechanical Engineers,* v. 73, Nov. 1951, p. 1085-1092.

Basic principles to be followed in the design of high-strength bolt and stud assemblies, the reasons underlying them and evidence in their support. Refers largely to steels. 31 ref. (Q7, ST)

30-Q. Buckling of Intermittently Supported Rectangular Plates. C. H. Norris, D. A. Polychrone, and L. J. Capozzoli. *Welding Journal,* v. 30, Nov. 1951, p. 546s-556s.

Studies of the buckling behavior of long rectangular plates intermittently supported on one or both long edges with various supports and loadings. Material studied was structural steel. (Q28, CN)

31-Q. Further Tests on Effects of Plastic Strain and Heat Treatment. Sadun S. Tor, Robert D. Stout, and B. G. Johnston. *Welding Journal,* v. 30, Nov. 1951, p. 576s-584s.

Covers transition-temperature test results of two plain carbon pressure-vessel steels in the following conditions: as-received, after 20% permanent tensile strain, after cylindrical bending and after hot or cold spherical pressing. (Q23, CN)

32-Q. Properties of Metals Used at Low Temperatures. *Welding Journal,* v. 30, Nov. 1951, p. 572s-575s.

A summary of nine papers previously published in the July 1951 issue of *Metal Progress* (Item 447-Q, 1951). Papers were presented at the Annual Metallurgical Conference and Open House held at the National Bureau of Standards on May 14 and 15, 1951. (Q general)

33-Q. High Strength Copper-Silver, Copper-Iron, and Copper-Iron-Chromium Wire. Webster Hodge, Ralph A. Happe, and Bruce W. Gonser. *Wire and Wire Products,* v. 26, Nov. 1951, p. 1033-1038, 1086.

Some new Cu-base alloys that have been made into wire to produce some unusual properties. The use of an insoluble metal like Fe, uniformly distributed as reinforcing fibers through the Cu matrix is an interesting new concept in wire making. (Q general, F28, Cu)

34-Q. A Study of Metal Transfer During Sliding, Using Radioactivation Analysis. E. Rabinowicz. *Proceedings of the Physical Society,* v. 64, sec. A, Oct. 1, 1951, p. 939-940.

A copper surface was slid over a steel surface, and as a result some Cu fragments were transferred to the steel. The steel specimen was then activated in a nuclear pile, and within a few hours of its removal from the pile an autoradiograph was made of its surface. Results are analyzed. (Q9, M23, Cu, ST)

35-Q. Cermets May Answer Jet Designers' Prayers. Parts I and II. W. J. Koshuba and J. A. Stavrolakis. *Iron Age,* v. 168, Nov. 29, 1951, p. 77-80; Dec. 6, 1951, p. 154-158.

While wear resistance, general high-temperature behavior and strength-to-weight ratio are good, cermets are less shock resistant, less ductile, and costly to produce. Applications in rockets, thermocouple protection tubes, induction-heating coils and electronic cathodes. (Q general, T25, T8)

36-Q. A Metallurgist Looks at Fracture. C. H. Lorig. *Metal Progress,* v. 60, Nov. 1951, p. 69-76.

Fracture aspect of metals. Demonstrates that microstructural features are responsible for several kinds of processes that can lead to fracture. Conditions of boundaries between grains and the nature of microconstituents at grain surfaces were studied. (Q26)

37-Q. Wrought Al-Zn-Mg Alloys. *Metal Progress,* v. 60, Nov. 1951, p. 114, 116, 118. (Condensed from "Observation on Some Wrought Aluminum-Zinc-Magnesium Alloys" by M. Cook, R. Chadwick and N. B. Muir.)

Previously abstracted from *Journal of the Institute of Metals.* See item 423-Q, 1951. (Q general, N12, Al)

38-Q. Properties and Uses of Lead and Its Alloys. W. H. Dennis. *Mine & Quarry Engineering,* v. 17, Dec. 1951, p. 391-394.

Emphasis is on mechanical properties. (Q general, T general, Pb)

39-Q. Mechanical Properties of Integrally Stiffened Aluminum Extrusions. Roberto Contini. *Product Engineering,* v. 22, Dec. 1951, p. 129-133.

Material properties, including values for skin and flanges, of integrally stiffened 24S and 75S Al alloy extrusions. Test results on behavior of tubular and flattened sections under column and bending loads. General comparison of data with design values. (Q general, Al)

40-Q. Heat Treated Brittle Coating Increases Sensitivity. A. J. Durelli and S. Okubo. *Product Engineering,* v. 22, Dec. 1951, p. 144-147.

Results of an investigation. Includes an example of a complete stress analysis using heat treated brittle coating on a valve under internal pressure. (Q25)

41-Q. The Nature of the Static and Kinetic Coefficients of Friction. Ernest Rabinowicz. *Journal of Applied Physics,* v. 22, Nov. 1951, p. 1373-1379.

Experiments were carried out to determine the transition between static and kinetic conditions when stationary metal surfaces are set into motion, a simple method being used which measures the energy that has to be given to one of the bodies to start it moving. The method is confined to cases in which the static coefficient exceeds the kinetic. 11 ref. (Q9)

42-Q. The Crystallographic Aspect of Slip in Body-Centered Cubic Single Crystals. I. Theoretical Considerations.

A. J. Opinsky and R. Smoluchowski. *Journal of Applied Physics,* v. 22, Nov. 1951, p. 1380-1384.

The mechanism of slip in body-centered cubic lattices is considered in terms of the relation between the orientation of the tensile axis and the active slip system. (Q24)

43-Q. Distribution of Slip in Metal Crystals. F. C. Frank. *Journal of Applied Physics,* v. 22, Nov. 1951, p. 1387.

Discusses previous literature findings on deformation in Zn crystals. (Q24, Zn)

44-Q. Surface Effect in the Cleavage of Zinc Monocrystals. John J. Gilman. *Journal of Metals,* v. 3, Dec. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1148-1149.

Certain normally ductile Zn monocrystals become extremely brittle when their surfaces are coated with Cu oxide or plate. Etching away the oxide layer made the crystal ductile again. Details of the phenomenon and possible mechanisms. (Q23, Q24, Zn)

45-Q. Change in Yield Strength During Aging in Iron. C. A. Wert. *Journal of Metals,* v. 3, Dec. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1179-1180.

Results of experiments on high-purity Fe (Puron). Aging was done at 40, 65, and 130° C., respectively, after carburizing to about 0.015% C. (Q23, Fe)

46-Q. New Aluminum Alloy Has Improved 600° F. Properties. *Iron Age,* v. 168, Dec. 13, 1951, p. 131.

Mechanical properties of "ML" alloy, developed by the Air Force for high-temperature use. Melting practice and pouring temperature. (Q general, E10, E23, Al, SG-h)

47-Q. Fatigue Strength of Nodular Iron Tested. T. E. Eagan. *Iron Age,* v. 168, Dec. 13, 1951, p. 136-139.

Tests were carried out on specimens cut from both standard cylinders and actual castings. Endurance ratio for the material is approximately 0.34. A 0.050-in. notch reduces fatigue strength by a factor of 1.3 for heat treated material, 1.45 for as-cast. Elongation is usually lower in castings than in keel blocks. (Q7, CI)

48-Q. Nickel Saved by Substituting 430 for 18-8. *Iron Age,* v. 168, Dec. 13, 1951, p. 144.

Chemistry and mechanical properties of Type 430 chromium stainless. (Q general, SS)

49-Q. Physical and Mechanical Properties of Cast Iron. W. Leighton Collins. *Mechanical Engineering,* v. 73, Dec. 1951, p. 979-982. (Based on "Engineering Properties of Cast Iron", *American Foundrymen's Society.*)

From the viewpoint of an engineer designing a load-resisting member. A design procedure is outlined. (Q general, T26, CI)

50-Q. A Study of Tracer Methods for Assessing Wear of Wire-Drawing Dies. J. C. E. Button, A. J. Davis, and R. Tourret. *Nucleonics,* v. 9, Nov. 1951, p. 34-43.

Irradiation of tungsten carbide dies was used to provide a means of measuring die wear. The activity of die debris adhering to drawn wires was then quantitatively measured by Geiger counters. (Q9, S19, F28, C-n)

51-Q. Creep of Annealed and Cold-Drawn High-Purity Copper. William D. Jenkins and Thomas G. Digges. *Journal of Research of the National Bureau of Standards,* v. 47, Oct. 1951, p. 272-287.

A study was made of the effect of temperature and stress on the creep behavior at 110, 250, and 300° F. of high-purity, oxygen-free, high-conductivity copper initially as annealed and as cold-drawn to 40% reduction of area. Correlations are made of changes in structure with time, stress, temperature, and discontinuous flow. (Q3, Cu)

52-Q. The M.I.T. Laboratory of Cryogenic Engineering. S. C. Collins, W. C Nason, Jr., and R. L. Cannaday. *Refrigerating Engineering,* v. 59, Dec. 1951, p. 1179-1182.

Equipment includes liquid-nitrogen plant, helium refrigerator, helium liquefier, and a tensile-testing machine to study stresses of metals at very low temperatures. (Q27)

53-Q. Mechanical Properties of Arc-Cast and Powder Metallurgy Molybdenum. James H. Bechtold and Howard Scott. *Journal of the Electrochemical Society,* v. 98, Dec. 1951, p. 495-504.

A survey. Micrographs, tables, and graphs. 14 ref. (Q general, Mo)

54-Q. Report on Nodular Cast Iron. *SAE Journal,* v. 59, Dec. 1951, p. 23-24, 26.

Correlation of test-bar properties. Comparison is made with malleable iron, steel castings, and gray iron. (Q general, CI)

55-Q. Vibration Failures. E. Colston Shephard. *Machine Design,* v. 23, Dec. 1951, p. 157-160, 208.

How service behavior of gas-turbine buckets is recorded and analyzed for design data. Continuous strain-gage record is radioed from plane in flight to a trailer on the

ground. Diagrams show details of strain-gage system. (Q25)

56-Q. Inspection; NAI Students Design Unique Stress Testing Rings. James Corcoran. *Western Machinery and Steel World,* v. 42, Nov. 1951, p. 103-104.

New dynamometer test method and apparatus. (Q25)

57-Q. Resistance to Thermal Shock. C. M. Cheng. *Journal of the American Rocket Society,* v. 21, Nov. 1951, p. 147-153.

Resistance of ceramic and ceramal materials to thermal shock can be determined by analyzing the nonsteady thermal stresses in the material. First the nonuniform temperature distribution is computed by using the heat-conduction equation. This temperature distribution is then used to compute thermal stress. Coefficients of thermal conduction and of thermal expansion, ultimate strength, Young's modulus and Poisson's ratio together with heating conditions are used to specify resistance to thermal shock. The theory is verified by comparing the results with NACA test data. (Q25)

58-Q. Strengths of Several Steels for Rocket Chambers Subjected to High Rates of Heating. R. L. Noland. *Journal of the American Rocket Society,* v. 21, Nov. 1951, p. 154-162.

A series of tests was conducted to determine the tensile strengths of one carbon and 11 alloy steels when subjected to rates of heating comparable to those encountered by the metal parts of solid-propellant rocket motors. These results indicate that time at temperature has a very definite effect upon high-temperature strength characteristics of the steels investigated. (Q23, CN, AY)

59-Q. On the Transverse Mechanical Properties of Forgings. A. Bartocci. *Engineers' Digest,* v. 12, Nov. 1951, p. 377-378. (Translated from *Metallurgia Italiana.*)

Previously abstracted from original. See item 9-Q, 1951. (Q general, F22, CN)

60-Q. Development of Research in High-Temperature Rheology of Metals. (Continued.) Paul Feltham. *Metal Treatment and Drop Forging,* v. 18, Oct. 1951, p. 455-459.

New methods which are slowly coming into prominence rely upon a detailed examination of the structural changes induced by heat and stress, rather than on simple mechanical tests. Apparatus is diagrammed and illustrated; photomicrographs show typical results. 22 ref. (Q24)

61-Q. Structural Changes During the Creep of Aluminium. *Metal Treatment and Drop Forging,* v. 18, Nov. 1951, p. 520-524, 528. (Based on a paper presented by Crussard and Wyon to the Société Francaise de Métallurgie in Paris.)

Results of an investigation on structural changes which occur particularly at high temperatures. 14 ref. (Q3, M27, Al)

62-Q. Temper Brittleness. J. Lomas. *Machinery* (London), v. 79, Nov. 22, 1951, p. 904-906.

Effect of alloying elements. A distinction is made between temper brittleness and blue brittleness. (Q23, ST)

63-Q. High-Temperature Embrittlement in Chromium-Iron Alloys Containing 12-16% Chromium. Helmut Thielsch. *Metallurgia,* v. 44, Nov. 1951, p. 220-226.

Embrittlement which may be shown by ferritic stainless steels on heating at elevated temperatures. Grain growth is not responsible and the suggestion is made that the embrittlement may be related to effects caused by solution of carbide at elevated temperatures. Means whereby the carbide solution may be prevented, or its effects overcome. (Q23, N8, SS)

64-Q. Some Factors Affecting Wear on Cemented Carbide Tools. E. M. Trent. *Engineer,* v. 192, Nov. 9, 1951, p. 599-600; *Machinery* (London), v. 79, Nov. 8, 1951, p. 823-829; Nov. 15, 1951, p. 865-869.

Experiments were carried out to determine the temperatures at which carbides react with steel to give a molten phase. A theory of cratering wear on carbide tools is proposed. (Q9, C-n)

65-Q. A Theoretical Derivation of the Plastic Properties of a Polycrystalline Face-Centered Metal. J. F. W. Bishop and R. Hill. *Philosophical Magazine,* ser. 7, v. 42, Nov. 1951, p. 1298-1307.

It is conjectured that the work done in plastically deforming a polycrystal is approximately equal to that which would be done if the grains were free to deform equally. In conjunction with the principle of maximum plastic work, this enables the yield function of an aggregate to be calculated. This is done for an isotropic aggregate of face-centered cubic crystals, following a determination of the stresses needed to produce multi-slip. (Q24)

66-Q. Formula for Creep Curves of Metals. Ryukiti Robert Hasiguti and Tosiro Owadano. *Nature,* v. 168, Oct. 20, 1951, p. 706.

Based on experiments on Al. (Q3, Al)

67-Q. Effect of Hydrogen on the Properties of Low-Alloy Steels. J. D. Hobson and C. Sykes. *Journal of the Iron and Steel Institute,* v. 169, Nov. 1951, p. 209-220.

A method by which hydrogen is introduced into steel specimens by heating them in the gas at high pressures. Its deleterious effect on the ductility of a number of low-alloy steels was investigated and shown to be reproducible, provided that their treatment is also considered. 12 ref. (Q23, AY)

68-Q. Macroscopic Surface Stresses Produced by Plastic Deformation. G. B. Greenough. *Journal of the Iron and Steel Institute,* v. 169, Nov. 1951, p. 235-241.

An investigation using a low-carbon steel containing 0.10% C., 0.36% Mn, 0.017% Si, and 0.007% P. Results show that there is a macroscopic compressive biaxial stress in the surface of an aggregate; the layer containing the stress being about two crystals ($8X10^{-3}$ in.) deep. 12 ref. (Q24, CN)

69-Q. The Fatigue of Metals; Grooved Parts. (In French.) M. Ros. *Revue de Métallurgie,* v. 48, Oct. 1951, p. 723-733.

Correlates results of tests made by LFEM during past 20 years, demonstrating that the Coulomb-Mohr theory can be considered as a general theory of the rupture of metals. (Q7)

70-Q. Behavior and Basic Principles of Metallic Structures. (In French.) J. F. Baker. *Revue de la Soudure; Lastijdschrift,* v. 7, No. 3, 1951, p. 128-146.

A review on the basis of the literature, with special regard to the ductility of steel. 37 ref. (Q23, ST)

71-Q. Pendulum Hysteresis Meter or Torsion Pendulum With Double Elastic Device for Measuring Internal Friction and Elastic Modulus of Metals in an Extensive Range From Very Low Temperatures up to 1300°. (In French.) Christian Boulanger. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 233, Oct. 1, 1951, p. 732-733.

Tests and results obtained with the above instrument. (Q21, Q22)

72-Q. Relation Between Internal Friction and Resistance to Creep of Steel as a Function of Microstructure. (In French.) Christian Boulanger, Georges Delbart, and Michel Ravery. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 233, Oct. 8, 1951, p. 794-796.

Results of study in which four different steel microstructure types were investigated. (Q22, Q3, M27, ST)

73-Q. Use of an Ethoxyline Resin in Three-Dimensional Photo-Elasticimetry According to a Solidification Technique. (In French.) Michel Ballet and Gaston Mallet. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 233, Oct. 15, 1951, p. 846-847.

Comparison with a similar study by N. C. Foster. (Q25)

74-Q. Special Mechanical Properties of Aluminum Alloys Having a High Yield Point and High Tensile Strength. (In French.) Marcel Tournaire. *Revue de l'Aluminium,* v. 28, Oct. 1951, p. 353-361.

Effects of fabrication process on mechanical properties, giving the best yield and tensile strengths attainable with various common Al alloys. (Q23, Al)

75-Q. The Heat Resistance of Cast Iron and the Effect of Different Alloying Elements. (In German.) H. Timmerbeil, G. Clas, and O. Mattern. *Giesserei,* v. 38, (new ser., v. 4), Sept. 20, 1951, p. 476-482; Oct. 4, 1951, p. 523-526.

Review of literature. Heat resistance of normal cast iron, Si cast iron, Cr-Si cast iron, and Al-Si cast iron. Part II reports on experiments on the influence of P on the heat resistance of gray iron castings, and also on Si, Cr-Si, and Al-Si cast iron. An alloy of 1.35% C, 6% Si, 0.6% P, < 0.025% S, 4% Al and about 0.2% Ti proved to be particularly heat resistant. (Q general, CI, SG-h)

76-Q. Aluminum - Zinc - Magnesium Base Alloys. (In German.) H. Hug. *Schweizer Archiv für angewandte Wissenschaft ünd Technik,* v. 17, Oct. 1951, p. 289-298.

Compositions, mechanical properties, transformations, and microstructures of various Al-Zn-Mg compositions. Only those which contain mostly Al are considered. (Q general, N general, M27, Al)

77-Q. Testing Heat Resistant Materials. (In German.) W. Deisinger. *Schweizer Archiv für angewandte Wissenschaft ünd Technik,* v. 17, Oct. 1951, p. 299-305.

Absence of uniform standards of high-temperature property testing. Various methods of determining mechanical properties of metals and alloys at elevated temperatures. 10 ref. (Q general, SG-h)

78-Q. The Influence of Precipitation Processes Upon the Determination of Creep Resistance of Light-Metal Alloys. (In German.) H. Vosskühler. *Metall,* v. 5, Nov. 1951, p. 475-479.

In order to avoid structural

changes during creep testing of light alloys, preliminary heating of the test rods is suggested. Method for the tests. Results seem most significant for Al-Mg alloys containing 8.50% Mg. 15 ref. (Q3, Al)

79-Q. The Hypothesis of Supporting Crystals in Metal Alloys for Bearings. (In German.) V. Schneider. *Metall,* v. 5, Nov. 1951, p. 490-494.

Application of the hypothesis to various bearing metals, in order to explain their frictional characteristics. It was found that other characteristics are more important for determining the suitability of an alloy for bearings. (Q9, T7, SG-c)

80-Q. Alternate Torsion Testing of Wires. (In Italian.) *Metallurgia Italiana,* v. 43, Oct. 1951, p. 421-424.

During the test, three distinct periods are evident: uniform deformation, localized deformation in a short length, and rupture. Results of application of this test to steels and several nonferrous alloys. (Q1)

81-Q. Some Data on the Influence of Forging Reduction on the Toughness of High Speed Steel. (In Italian.) Giorgio Magliano. *Metallurgia Italiana,* v. 43, Oct. 1951, p. 439-442.

Results of tests on round bars already reduced 50-96% in an attempt to reduce the minimum forging reduction necessary to obtain satisfactory core properties. Such reduction does not appear to be feasible. (Q23, F22, TS)

82-Q. Quality and Methods of Testing of Hoes. (In Portuguese.) Joao Gustavo Haenel and Rubens Lima Pereira. *Boletim da Associacao Brasileira de Metais,* v. 7, July 1951, p. 247-282.

A detailed comparative study of the technological characteristics of various kinds of Brazilian steel hoes in relation to well-known foreign-make steel hoes. (Q general, ST)

83-Q. Study of Properties of Sintered Steels. (In Portuguese.) Vicente Chiaverini and Carlos de Revoredo Barros. *Boletim da Associacao Brasileria de Metais,* v. 7, July 1951, p. 346-365.

Results of experiments on mechanical and physical properties using sintered steel of different compositions and method of preparation. (Q general, P general, ST)

84-Q. (Book) Simplified Mechanics and Strength of Materials. Harry Parker. 215 pages. John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. $4.00.

A survey of all the mechanical forces to be considered in construction. Specific applications to columns, rivets and welds, shafts, pipes, tanks, concrete retaining walls and dams. A wide variety of illustrative problems; also tables of allowable stresses, properties of sections, and other engineering data. (Q23, Q25)

85-Q. Plastic-Wave Propagation Effects in High-Speed Testing. E. H. Lee and H. Wolf. *Journal of Applied Mechanics,* v. 18, *(Transactions of the American Society of Mechanical Engineers,* v. 73), Dec. 1951, p. 379-386.

A material test carried out at high speed may be markedly influenced by plastic-wave propagation effects. In such a case, variation of strain occurs along the test specimen, and the stress-strain relation cannot be determined from measurements made on the specimen as a whole. The theoretical plastic-wave analysis of a particular test arrangement is given. Range of speed is determined which permits satisfactory interpretation without need for detailed analysis of plastic-wave propagation. Application to other test arrangements. (Q27)

86-Q. Protecting Refinery Pressure Equipment From Graphitization. D. B. Rossheim, J. J. Murphy, R. H. Caughey, and Q. B. Hoyt. *Petroleum Processing,* v. 6, Dec. 1951, p. 1385-1388.

Results of studies of carbon and low-alloy steel metal deterioration in some catalytic-cracking equipment. Precautions to be taken and materials for new construction. Causes of cracking, including stresses in bimetallic construction. (Q25, N8, CN, AY)

87-Q. Flexural Fatigue Strengths of Riveted Box Beams—Alclad 14S-T6, Alclad 75S-T6, and Various Tempers of Alclad 24S. I. D. Eaton and Marshall Holt. *National Advisory Committee for Aeronautics,* Technical Note 2452, Nov. 1951, 25 pages.

Results of an investigation. 11 ref. (Q7, Al)

88-Q. Melt Quality and Fracture Characteristics of 85-5-5-5 Red Brass and 88-8-4 Bronze. R. D. Shelleng, C. Upthegrove, and F. B. Rote. *Transactions of the American Foundrymen's Society,* v. 59, p. 67-76; disc., p. 76-78.

Previously abstracted from Preprint 55. See item 284-Q, 1951. (Q26, E25, Cu)

89-Q. Mechanical Properties of Cast Steel as Influenced by Mass and Segregation. John F. Wallace, John H. Savage, and Howard F. Taylor. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 223-242; disc., p. 242-243.

Investigation on four heats of various low-alloy steels. (Q general, M27, ST)

90-Q. Effect of Vanadium on the Properties of Cast Chromium-Molybdenum Steels. N. A. Ziegler, W. L.

Meinhart, and J. R. Goldsmith. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 261-274; disc., p. 274-275.

Previously abstracted from Preprint 2. See item 281-Q, 1951.
(Q general, M27, N8, K9, CI)

91-Q. Influence of Silicon Content on Mechanical and High-Temperature Properties of Nodular Cast Iron. W. H. White, L. P. Rice, and A. R. Elsea. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 332-345, disc., p. 345-347.

Previously abstracted from Preprint 5. See item 282-Q, 1951.
(Q general, P general, CI)

92-Q. Silicon-Chromium Alloy in Complicated Iron Castings. Ralph A. Clark. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 401-409; disc., 409-411.

Four automobile cylinder castings were poured from cylinder grades of cast iron alloyed in various ways. Mechanical properties were determined for the various specimens. Variations in cooling rate brought about wide variations in microstructure and hardness.
(Q general, M27, E25, CI)

93-Q. Effect of Phosphorus Content on Mechanical Properties of a Nodular Cast Iron. J. E. Rehder. *Transactions of the American Foundrymen's Society,* v. 59, p. 501-508; disc., p. 508.

Previously abstracted from Preprint 43. See item 283-Q, 1951.
(Q general, E25, CI)

94-Q. A Castability and Property Comparison of Several Magnesium-Rare Earth Sand Casting Alloys. K. E. Nelson and F. P. Strieter. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 532-543; disc., p. 543-545.

Castability and tensile and creep properties of aircraft engine castings made from a group of Mg-rare earth alloys were investigated.
(Q27, Q3, E25, Mg)

95-Q. The Influence of Surface Films on the Friction, Adhesion, and Surface Damage of Solids. F. P. Bowden. *Annals of the New York Academy of Sciences,* v. 53, art. 4, June 27, 1951, p. 805-823.

Reviews some recent experimental investigations on the part played by surface films in the friction and adhesion of solids. The bearing of these results on the theory of friction. 16 ref. (Q9)

96-Q. Measurement of the Incremental Friction Coefficient of Several Homologous Series of Straight-Chain Hydrocarbon Compounds. S. F. Murray and J. T. Burwell. *Annals of the New York Academy of Science,* v. 53, art. 4, June 27, 1951, p. 906-918.

Coefficient was measured as a function of rotation of one low-carbon steel cylinder against another one for a number of straight-chain polar hydrocarbons, which included alcohols, acids, amines, and two esters. Five of the alcohols were also tested using 24S-T Al alloy cylinders. 15 ref. (Q9, CN, Al)

97-Q. Influence of Roughness and Oxidation on Wear of Lubricated Sliding Metal Surfaces. C. B. Davies. *Annals of the New York Academy of Science,* v. 53, art. 4, June 27, 1951, p. 919-935.

Measurements were made, at room temperature, of the wear of a flat steel annulus flooded with lubricant and pressing against the lower end of a small vertical cylindrical tungsten carbide pin. In another apparatus, reciprocating motion produced rubbing of Ag-Cu combinations and mild steel against Ni-Cr steel in oxygen, nitrogen, or air. Effects of surface-active agents and of other chemicals on wear and corrosion were studied.
(Q9, R2, Ag, Cu, CN, AY)

98-Q. The Luders Deformation of Mild Steel. *Proceedings of the Physical Society,* v. 64, ser. B. Dec. 1, 1951, p. 1085-1086.

Experiments extended to the "blue-brittle" range—around 200° C. Here the deformed area just beyond the Lüders front ages very rapidly during the test, so that yield stress in this region is much above applied stress. After testing, marked curvature remains in the sample.
(Q24, CN)

99-Q. Abrasion and Polishing, Friction and Wear. P. Dinichert. *Microtecnic* (English Ed.), v. 5, Sept.-Oct. 1951, p. 225-232.

The necessity for considering submicroscopic or even atomic dimensions when questions on the above are dealt with. Reference to this phenomenon in metals. (Q9, L10)

100-Q. New Applications of the Micromachine Type MI/44. S. A. Sadamel. *Microtecnic* (English Ed.), v. 5, Sept.-Oct. 1951, p. 233-240.

Machine for tensile testing of metal wires and strips and of textile threads and fibers. Tests on 18-8 stainless cold worked wire are shown as examples. (Q27, SS)

101-Q. Study of Some Properties of Nodular Graphite Cast Irons. (Concluded) (In French.) Marcel Ballay, Raymond Chavy and Jacques Grilliat. *Fonderie,* Oct. 1951, p. 2636-2651, disc, p. 2651-2652.

Mechanical properties, technique of tensile testing, comparison with properties of American malleable cast iron, and comparison of cast

iron and steel ductility.
(Q general, Q27, CI)

102-Q. Creep Tests on Steel Wire at Room Temperature. (In German.) Alfred Krisch. *Archiv für das Eisenhüttenwesen,* v. 22, Sept.-Oct. 1951, p. 313-316.

Tests were made over a period of more than 1000 hr. on five patented steel wires and on one type of wire subjected to a final oil quench. Details of tests; behavior of the wires in reinforced concrete. 10 ref.
(Q3, ST)

103-Q. Mathematics of the Tensile Test. (In German.) Hans Kostron. *Archiv für das Eisenhüttenwesen,* v. 22, Sept.-Oct. 1951, p. 317-324; disc., p. 324-325.

Proposes equation making possible the calculation of various stresses. Practical application of mode of calculation is indicated. 16 ref. (Q27)

104-Q. Correlation Between Stress and Deformation Gradient. Part 2. Influence of Form and Scale. (In German.) Franz Bollenrath and Alex Troost. *Archiv für das Eisenhüttenwesen,* v. 22, Sept.-Oct. 1951, p. 327-335.

Theoretically investigates and diagrams a new method for designating the influence of irregular stress and deformation distribution upon the hindering of plastic deformation. The terms used are indexed. Practical application is suggested. 11 ref.
(Q23)

105-Q. The Behavior of Sintered Iron During Nitriding. (In German.) Werner Koster and Josef Raffelsieper. *Archiv für das Eisenhüttenwesen,* v. 22, Sept.-Oct. 1951, p. 337-341.

Microstructure, density, hardness, and bend strength of various Fe-powder sintered bodies were determined.
(Q29, Q5, P10, M27, J28, Fe)

106-Q. A Survey of Recent Research on Creep of Engineering Materials. Joseph Marin. *Applied Mechanics Reviews,* v. 4, Dec. 1951, p. 633-634.

48 references. (Q3)

107-Q. The Effect of Hydrogen on Steel and Formation of Hair-Line Cracks. A. B. Chatterjea and B. R. Nijhawan. *Current Science,* v. 20, Apr. 1951, p. 20, 90-91. (Reprint)

A review. 26 ref. (Q general, ST)

108-Q. A Piezoelectric Method for Determining Young's Modulus and Its Temperature Dependence. H. E. Stauss, F. E. Martin, and D. S. Billington. *Journal of the Acoustical Society of America,* v. 23, Nov. 1951, p. 695-696.

A resonance method for determining Young's modulus in metals is based on support of the specimen at its central node for longitudinal vibrations, with the supporting rod articulating at its lower end with a piezoelectric crystal. Utility of the method was extended by adapting it to measurement of changes in Young's modulus with temperature.
(Q21)

109-Q. Use of Rare Earth Metals in Magnesium Casting Alloys. J. C. McDonald. *Light Metal Age,* v. 9, Dec. 1951, p. 13-14, 16.

Characteristics sought in casting alloys for service at elevated temperatures. Mechanical properties and behavior in the foundry of Mg—rare earth metal alloys. Advantages over Mg-Al-Zn type alloys.
(Q general, E25, Mg, SG-h)

110-Q. The Hardness Test as a Measure of Micro-Porosity in Aluminum and Magnesium Castings. Harry Czyzewski. *Light Metal Age,* v. 9, Dec. 1951, p. 24, 26.

Method utilizing simple hardness testing and charting of data for the control of microporosity. Considerably simplifies the production control of this factor. Advantages and practical applications of this method. (Q29, E25, Al, Mg)

111-Q. Scales for Determining Stiffness and Strength of Structural Metals. *Materials & Methods,* v. 34, Dec. 1951, p. 107.

A series of logarithmic scales arranged to provide a means for finding the relative sheet, plate, or beam thickness required for various metals of equal stiffness or equal strength, respectively.
(Q23, ST, Cu, Ti, Al, Mg)

112-Q. Influence of Microstructure on Creep Resistance. Georges Delbart and Michael Ravery. *Metal Progress,* v. 60, Dec. 1951, p. 62-68.

Results of an investigation. Material used was a Cr-Mo steel. Tests showed that there was a strong influence of microstructure on the surface performance of low-alloy, high-temperature steels. Data are tabulated and graphed. Micrographs.
(Q3, M27, AY, SG-h)

113-Q. Simple Tester for Hardness of Hot Materials. R. F. Domagala and W. R. Johnson. *Metal Progress,* v. 60, Dec. 1951, p. 72-73.

A rapid, reproducible method for testing hot hardness of materials at temperatures approaching their melting points. Examples of tests on Mo, Si, and VSi_2. (Q29, Mo, Si)

114-Q. Properties of Nimonic Alloys. *Metal Progress,* v. 60, Dec. 1951, p. 80-B.

Charts and tables on the chemical composition, physical and mechanical properties, and heat treatments

of Nimonic Alloys.
(Q general, P general, J23, J27, Ni)

115-Q. Jigs for Positioning Keyhole Notch. C. D. Foulke. *Metal Progress,* v. 60, Dec. 1951, p. 81.

Two jigs for the uniform preparation of keyhole notch-impact specimens. (Q6)

116-Q. High Purity Zirconium Metal. F. B. Litton. *Metal Progress,* v. 60, Dec. 1951, p. 83-86.

Results of an investigation. The work-hardening curves for iodide and arc melted iodide zirconium were similar, except that approximate maximum hardnesses were attained at 70 and 60% cold reduction, respectively. The maximum hardness was Rockwell A-52 for both materials after 90% cold reduction. The penetration of O_2 into Zr at 1020, 1380 and 1740° F. was determined for 2-hr. heating periods in still air. Hardness measurements showed that approximately 0.35-mm. penetration occurred at 1380 and 1740° F. Micrographs. (Q29, Q24, Zr)

117-Q. Shock Wave Propagation in Metals. Werner Goldsmith. *Metal Progress,* v. 60, Dec. 1951, p. 92-96.

Shock loading represents the exact opposite of static loading and consists of the instantaneous application of an external force to a structural member. Types of waves resulting from impact loading are compression waves, rarefaction, shear, bending, and two types of surface waves. Tests were conducted on mild steel. (Q6, CN)

118-Q. Fracture of Metals. *Metal Progress,* v. 60, Dec. 1951, p. 148, 150. (Condensed from "The Fracture Process in Plastic Metals", Ya. G. Fridman and T. K. Zilova.)

Previously abstracted from *Doklady Akademii Nauk SSSR.* See item 780-Q, 1950. (Q26, ST)

119-Q. Strains and Stresses. *Metal Progress,* v. 60, Dec. 1951, p. 162, 164. (Condensed from "Concentration of Strains and Stresses at Large Plastic Strains," Ya. B. Fridman and T. K. Zilova).

Previously abstracted from *Doklady Akademii Nauk SSSR.* See item 835-Q, 1950. (Q24, Q25)

120-Q. A Study of Elastic and Plastic Stress Concentration Factors Due to Notches and Fillets in Flat Plates. Herbert F. Hardrath and Lachlan Ohman. *National Advisory Committee for Aeronautics,* Technical Note 2566, Dec. 1951, 23 pages.

Six large 24S-T3 Al alloy sheet specimens containing various notches or fillets were tested in tension to determine their stress concentration factors in both the elastic and plastic ranges. Diagrams and graphs. 12 ref. (Q27, Al)

121-Q. A Study of Slip Formation in Polycrystalline Aluminum. Aldie E. Johnson Jr., and S. B. Batdorf. *National Advisory Committee for Aeronautics,* Technical Note 2576, Dec. 1951, 18 pages.

Experimental results shed light on the assumptions that have been made in several attempts to bridge the gap between physical and mathematical theories of plasticity. The results are compatible with, but do not necessarily verify, the conception that plastic deformation in strain-hardening materials is primarily due to slip. Photomicrographs. (Q24, Al)

122-Q. On the Angular Distribution of Slip Lines in Polycrystalline Aluminum Alloy. John M. Hedgepeth, S. B. Batdorf, and J. Lyell Sanders, Jr. *National Advisory Committee for Aeronautics,* Technical Note 2577, Dec. 1951, 18 pages.

An attempt to assess quantitatively the adequacy of a model used by examining the statistical distribution of slip angles—those angles which express the orientation of slip lines. Theoretical distributions are derived on the basis of the model and are compared with an experimental distribution obtained from previous investigations. Photomicrographs. (Q24, Al)

123-Q. Relations Beteen the Modulus of Elasticity of Binary Alloys and Their Structure. Werner Koster and Walter Rauscher. *National Advisory Committee for Aeronautics,* Technical Memorandum 1321, Nov. 1951, 49 pages. (Translated.)

Previously abstracted from *Zeitschrift für Metallkunde.* See item 4C-19, 1949. (Q21, M27)

124-Q. Elevated Temperature Properties of Titanium Carbide Base Ceramals Containing Nickel or Iron. A. L. Cooper and L. E. Colteryahn. *National Advisory Committee for Aeronautics,* Research Memorandum E51110, Dec. 3, 1951, 47 pages.

The properties studied were oxidation, modulus of rupture, tensile strength, and thermal-shock resistance. Metallographic structure was studied. Tables, graphs, and micrographs. 13 ref.
(Q general, R2, M27, C-n, Ti)

125-Q. Formula for Creep Curves of Metals. E. N. Da C. Andrade. *Nature,* v. 168, Dec. 8, 1951, p. 1007.

Compares a 3-constant and a 4-constant formula. (Q3)

126-Q. Damping Capacity Measurements as an Aid to the Metallurgist. E. Linacre. *Research,* v. 4, Dec. 1951,

p. 540-541.
Technique of damping capacity measurements. Use in determination of diffusion coefficients, grain size, intensity of magnetization and phase change on transformation. (Q8, M23)

127-Q. Some Experience With Boiler Plate in Penstock Construction. W. Müller. *Sulzer Technical Review*, no. 2, 1951, p. 12-24.
Examples of difficulties encountered with plate material for high-pressure pipe lines, and suggestions as to how they can be avoided or remedied. Includes information on mechanical properties, specifications, inspection, welding, and heat treatment. (Q general, S21, S22, CN)

128-Q. The Development of Aluminum-6 Per Cent Magnesium Wrought Alloys for Elevated-Temperature Service. K. Grube and L. W. Eastwood. *U. S. Atomic Energy Commission*, AECD-3003, July 15, 1950, 28 pages.
It was found that addition of 0.5% Cr and approximately 0.10% Ti produces an alloy which, after stabilization at 600° F. prior to test, has higher tensile properties at room temperature and at 600° F. than does 24S. Data are tabulated and graphed. (Q27, Al)

129-Q. Development of Low Alloy High Tensile Structural Steel. I. M. Mackenzie and J. M. Pow. *West of Scotland Iron and Steel Institute Journal*, v. 57, 1949-50, p. 85-116; disc., p. 117-124.
The effect of composition and heat treatment on resistance to plastic deformation, resistance to rupture, ability to relieve local stress concentrations, and ease of fabrication with particular reference to economic considerations. The importance of basing design on a proof-stress criterion in order to obtain the maximum benefit from high-tensile steels is emphasized. Recent developments in the C-Mn and Mn-Mo type of steels. (Q23, Q25, AY)

130-Q. Symposium on Residual Elements in Steel. Factors Affecting the Rolling and Hot Working of Mild Steel Plates. E. C. Houston. **The Effect of Residual Elements in Steel on the Manufacture of Steel Tubes.** W. A. Smith. **Residual Elements in Steel.** H. Harris. *West of Scotland Iron and Steel Institute Journal*, v. 57, 1949-50, p. 193-235; disc., p. 236-241.
Causes of defects which may arise during the hot processing and welding of mild steel plates and tubes. Effects of high sulfur resulting from pick-up from the furnace atmosphere or from segregation. Effect of residual alloys. Small quantities of Sn, Cu, and Ni were shown to have a bad effect as determined by hot bend tests. Method of scale formation and the formation of low melting point constituents in the scale resulting in grain-boundary attack. Results are tabulated, graphed, and illustrated.
(Q general, F23, F26, CN)

131-Q. Hard Metals (Sintered Carbides) as Tools for Cold Working Operations. (In Czech.) M. Petrdlik. *Hutnické Listy*, v. 6, Oct. 1951, p. 484-489.
Production of hard alloys of the WC-Co type containing up to 30% Co. Variations in mechanical properties with Co content. Three examples of the use of hard metals containing a high percentage of Co for cold working operations. Diagrams, graphs, tables, and illustrations.
(Q general, T5, C-n)

132-Q. Determination of Residual Strains in Sintered Pieces. (In French.) J. Pomey, F. Goutel, and L. Abel. *Métaux: Corrosion-Industries*, v. 26, Sept. 1951, p. 347-356; Oct. 1951, p. 377-391.
Macroscopic strains due to anisothermic hardening were investigated. Part I reviews the problem. Part 2: Superficial measures deduced from Hertzian hardness with respect to preliminary strains, explored points, and corresponding Mohr circles; superficial strains after cementation and hardening; and application to carbonitrided surfaces. Part 3: Methods for determining strains inside sintered bodies. Part 4: Applications of the various methods. (Q25)

133-Q. Results of Fatigue Tests Under Increasingly Heavy Loads. (In French.) Marcel Prot. *Revue de Métallurgie*, v. 48, Nov. 1951, p. 822-824.
Advantages of this technique. Data are charted for various steels, Al and Mg alloys. (Q7, ST, Al, Mg)

134-Q. Micrographic Study of the Temper Brittleness of Low Alloy Carbon Steel. (In French.) *Revue de Métallurgie*, v. 48, Nov. 1951, p. 825-852.
New information concerning micrographic technique and results and possibilities of its application to detecting temper brittleness and its causes. Micrographs and tables. 16 ref. (Q23, M21, AY)

135-Q. Study of the Temper Brittleness of Certain Steels by X-Ray Diffraction. (In French.) Adrienne R. Weill. *Revue de Metallurgie*, v. 48, Nov. 1951, p. 853-857.
Results of experiments using X-ray diffraction for distinguishing between a piece of steel in the tough state and the brittle state. Data are tabulated. (Q23, M22, ST)

136-Q. Application of the Microsclerometric Meyer Analysis to Temper

Brittleness. (In French.) H. Bückle. *Revue de Métallurgie,* v. 48, Nov. 1951, p. 858-863.

Results of experiments of other investigators on above for low-alloy steels. Tables and graphs. 24 ref. (Q23, Q29, AY)

137-Q. Influence of Temperature on the Elastic Constants of Metals and Alloys. (In French.) Georges Vidal, Pierre Lescop, and Louis Raymondin. *Revue de Métallurgie,* v. 48, Nov. 1951, p. 864-874; disc., p. 874.

Brief discussion from the physical, metallographic, and mechanical points of view. Tables, diagrams, and graphs. 14 ref. (Q21)

138-Q. Study of the Internal Disorientation in Aluminum-Magnesium Alloy Single Crystals Subjected to Plastic Deformation. (In French.) J. Hérenguel and P. Lelong. *Revue de Métallurgie,* v. 48, Nov. 1951, p. 875-878.

Two methods are use of Lacombe's etching reagent and anodic oxidation of thin films of an Al+3% Mg alloy. Photomicrographs and diagrams. (Q24, M26, Al)

139-Q. Crystal Displacements in a Monocrystalline Sheet of Aluminum During Rolling. (In French.) Raymond Jacquesson and Jack Manenc. *Revue de Métallurgie,* v. 48, Nov. 1951, p. 883-887.

See abstract from *Comptes Rendus,* item 351-Q, 1951. (Q24, Al)

140-Q. Creep and Relaxation of Drawn Wires. (In French.) Robert de Strycker. *Revue de Métallurgie.* v. 48, Nov. 1951, p. 888-893, disc., p. 893.

Details of test procedure and influence of natural and artificial aging on relaxation properties. Data are tabulated and discussed for patented and drawn steel wire. (Q3, ST)

141-Q. Influence of Surrounding Medium on Plastic Deformation of Metals. (In Italian.) Georges Masing. *Metallurgia Italiana,* v. 43, Nov. 1951, p. 467-470.

Conclusions of Rehbinder and coworkers are confirmed, except for effect on electrical resistance. Theoretical analysis of the observations. (Q24, P15)

142-Q. Increase of Fatigue Strength of Welded Joints by Surface Peening. I. V. Kudriatsev and N. M. Savvina. (In Russian.) *Avtogennoe Delo,* v. 22, Apr. 1951, p. 8-12.

Cylindrical, plate, and channel-beam fatigue specimens were prepared by butt and lap arc welding and were given various stress relief and peening treatments. Data are tabulated and charted. 14 ref. (Q7, G23, CN)

143-Q Dynamic Coefficient During Concentrated Loading. (In Russian.) V. N. Danilov. *Doklady Akademii Nauk SSSR,* new ser., v. 78, June 21, 1951, p. 1135-1136.

Dynamic coefficient is defined. Soft steel, red brass, Al, Pb, Sn, and a Sn-Pb alloy are included in the investigation. Data are charted. (Q27, CN, Cu, Al, Pb, Sn)

144-Q. The Relationships of Properties in the Series of Metals Copper-Silver-Gold. (In Russian.) Sh. Ia. Korovskii. *Zhurnal Obshchei Khimii,* v. 21 (83), Mar. 1951, p. 429-432.

Regularities and variations of mechanical and physical properties of this series of metals. Data are tabulated. (Q general, P general, Cu, Ag, Au)

145-Q. Directional Hardness Differences in Silicon Carbide Crystals. W. Stern. *Industrial Diamond Review,* new ser., v. 11, Nov. 1951, p. 237-239; Dec. 1951, p. 255.

Tests show that the grinding and polishing direction is a factor in the life and performance of various carbides. (Q29, G18, Si, C-n)

146-Q. New Hardness and Wear Testers. *Industrial Diamond Review,* new ser., v. 11, Dec. 1951, p. 261-263.

New apparatus for testing shear and scratch hardness, cutting resistance and machinability of metals. (Q29, Q9)

147-Q. English Use Boron in Normalized and Drawn Heavy Sections. W. E. Bardgett. *Iron Age,* v. 169, Jan. 10, 1952, p. 81-84.

Evaluates the addition of boron to low-alloy and low-carbon steels. Effect on tensile and yield stress. Effect of Mo in varying amounts. (Q27, AY)

148-Q. Ingot Mould Irons; Mechanical Properties. J. W. Grant. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 590-594; disc., p. 605.

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 495-Q, 1951. (Q general, CI)

149-Q. Poisson's Ratio; Variations in Cast Iron for Ingot Moulds. J. Woolman. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 594-596.

It is important to have some knowledge of Poisson's ratio so that an estimation of stresses induced in ingot molds will be as accurate as possible. Results are tabulated and discussed. (Q21, T5, CI)

150-Q. Ingot Moulds; Determination of Surface Stresses. M. W. Buttler and W. H. Glaisher. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 600-604; disc., p. 639-644.

gated: an extremely pure sample, one of intermediate purity, and one with an addition of 0.006 at. % Al. Graphs and tables. (P12, Ge)

399-P. Influence of the Impurities in the Foil, Electrolyte and Paper in the Electrolytic Capacitor. Gaston Muriset. *Journal of the Electrochemical Society,* v. 99, July 1952, p. 285-288.

Effect on the leakage current. Anode material considered is Al of different purities. Graphs. 12 ref. (P15, T1, Al)

400-P. Production of Nickel Carbide by Decomposition of n-Hexane on Metallic Nickel. A. Cimino and G. Parravano. *Journal of Physical Chemistry,* v. 56, June 1952, p. 706-707.

Additional data on the formation and properties of low-temperature metal carbides. Graphs and tables. (P13, Ni, C-n)

401-P. Sorption of Gases on Metal Powders and Subsequent Change in Metal Reactivity at Room Temperature. Hung Li Wang and Norman Hackerman. *Journal of Physical Chemistry,* v. 56, June 1952, p. 771-774.

The amounts of Cl_2, NO_2, O_2 and CO taken up by powders of stainless steel, Ni, and Mo were measured at room temperature. Reactivities of metal powders, in terms of H_2 evolution in dilute-acid solutions in the absence of air, were determined for reduced stainless steel, Ni and Cr powders when they were bare, with CO adsorbed, or when covered with sorbed oxygen. Graphs and tables. (P13, SS, Ni, Mo, Cr)

402-P. Inelastic Scattering of Protons From Nickel. Ralph Ely, Jr., A. J. Allen, J. S. Arthur, R. S. Bender, H. J. Hausman, and E. M. Reilley. *Physical Review,* ser. 2, v. 86, June 15, 1952, p. 859-860.

Energy levels in Ni were observed at 90°. 20 levels are reported. Energy spectra and tables. (P10, Ni)

403-P. Magnetostrictive Vibration of Prolate Spheroids. Ni-Fe and Ni-Cu Alloys. J. S. Kouvelitest and L. W. McKeehan. *Physical Review,* ser. 2, v. 86, June 15, 1952, p. 898-904.

A study of different magnetic properties determined from the magnetostrictive vibrational behavior of small ferromagnetic prolate spheroids was extended to a large number of Ni-Fe (88, 84, 79, 68, 56, and 45 at. % Ni) and Ni-Cu (90, 84, 81, and 71 at. % Ni) alloys. Results for plain-annealed and magnetic-annealed specimens. A 68% Ni Permalloy was investigated in cold worked, baked, and annealed conditions. Graphs and tables. 11 ref. (P16, Ni, Fe, Cu)

404-P. Gyromagnetic Effect in a Superconductor. R. H. Pry, A. L. Lathrop, and W. V. Houston. *Physical Review,* ser. 2, v. 86, June 15, 1952, p. 905-907.

The gyromagnetic ratio of a superconducting tin sphere was measured by the Einstein-DeHaas method. The result is approximately that to be expected on the picture of perfectly free superconducting electrons and is in agreement with the work of Kikoin and Gubar. Apparatus diagram and graph. (P15, Sn)

405-P. Radioactivities of Platinum and Iridium From Photonuclear Reactions in Platinum. Darleane Christian, Russel F. Mitchell, and Don S. Martin, Jr. *Physical Review,* ser. 2, v. 86, June 15, 1952, p. 946-950.

The products of photonuclear reactions induced in Pt by a 70-Mev. synchrotron X-ray beam were studied. No Os activities were found. The Ir fraction included two new isotopes. Relative yields of all radioactive isotopes were measured. Graphs. 14 ref. (P13, Pt, Ir, Os)

406-P. Comparison of Magnetoelastic Energy Losses and Magnetic Hysteresis in Ferromagnetic Materials. G. Bonfiglioli, A. Ferro, and G. Montalenti. *Physical Review,* ser. 2, v. 86, June 15, 1952, p. 959-961.

Compares values of losses in mechanical and magnetic hysteresis loops when the alteration (disregarding the sign) of domain structure produced by magnetic field or by mechanical stress is the same. Materials dealt with are Ni, alloy steel, carbon steel, pure annealed iron, and Armco iron. Table and graphs. 10 ref. (P16, Ni, AY, CN, Fe)

407-P. Relative Pair Production Cross Sections in the Energy Region 50 to 300 Mev. C. R. Emigh. *Physical Review,* ser. 2, v. 86, June 15, 1952, p. 1028-1035.

A cloud-chamber survey was made of pairs produced in Al, Ag, Au, and Th foils by an X-ray beam from the 300-Mev. betatron. By comparing the pairs produced in two of the foils mounted to intercept the same X-ray beam, values of relative pair production cross sections for Ag to Al, Au to Al, and Th to Al were found. Graphs and apparatus diagram. 12 ref. (P10, Al, Ag, Au, Th)

408-P. The Junction Transistor. Morgan Sparks. *Scientific American,* v. 187, July 1952, p. 29-32.

An account of underlying principles and present state of develop-

ment of one of two forms of a device that amplifies electricity by the flow of electrons in a crystal. Chiefly deals with germanium. Diagrams. (P15, T1, Ge)

409-P. (French.) **The Sign of the Thermo-Electric Electromotive Force of Silicon.** Jean Savornin and France Fourrier-Savornin. *Comptes Rendus hebdomadaires des Séances de l'Academie des Sciences,* v. 234, May 26, 1952, p. 2165-2167.

Experimental arrangement leading to the finding that contrary to theoretical expectations, Si is thermo-electrically positive. Bismuth was found to be the most simple negative body. (P15, Si, Bi)

410-P. (German.) **Measurement of Instantaneous Induction Values and Field Strengths, and of Magnetic Reversal Losses, of Electrical Sheets.** Willi Krug. *Archiv für das Eisenhüttenwesen,* v. 23, May-June 1952, p. 207-215.

Theoretical basis and construction of ferrometer, and its application to above measurements. The quality of the instrument is evaluated on the basis of the results. Graphs and diagrams. (P16, ST)

411-P. (English.) **Sorption of Gases on Metal Films.** F. C. Tompkins. *Zeitschrift für Electrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Apr. 1952, p. 360-363.

Mechanisms of sorbtion and methods for its study, with emphasis on catalytic effects. (P13)

412-P. (German.) **The Surface Condition of Copper Between 500 and 850° C.** F. Erdmann-Jesnitzer and F. Günther. *Zeitschrift für Electrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Apr. 1952, p. 386-389; disc., p. 389-390.

On the basis of the experiments, melting of surface layers 10^{-3} to 10^{-4} mm. thick, as described by K. Lichtenecker, is reconsidered. (P12, Cu)

413-P. (German.) **Energy Transmission Mechanism and Rate of Reaction on Metallic Surfaces.** K. Schäfer. *Zeitschrift für Electrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Apr. 1952, p. 398-403.

Experiments concerning the relationship between the energy-transmission mechanism to the adsorbed molecules, and their chemical reactions on the surfaces. The method of measurement establishing the thermal accommodation coefficient of ethane on the metallic surfaces of Pt-Cu alloys. Results are interpreted and an explanation of the phenomenon is proposed. Tables and graphs. (P13, Pt, Cu)

414-P. (German.) **Dissociation of Zirconium Iodide on Hot Metal Surfaces.** H. Döring and K. Moliere. *Zeitschrift für Electrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Apr. 1952, p. 403-407; disc., p. 407-408.

Measurements of reaction rate of above dissociation by the method of van Arkel and de Boer. Characteristic curve of growth rate with wire and vessel temperature and formation of iodides of lower valence. (P13, Zr)

415-P. (German.) **Electron Emission of a Silver Surface Caused by Iodine.** H. Paproth, W. Rathje, and I. N. Stranski. *Zeitschrift für Electrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Apr. 1952, p. 409-413; disc., p. 413-414.

Experiments in which the emission of negative electrons was observed. Dependence of the emission upon voltage and temperature; nature of the emitted electrons. Proposes theory of so-called chemoelectric emission as an explanation for the phenomenon. 13 ref. (P15, Ag)

416-P. (German.) **Heat of Fusion of Aluminum and Germanium.** Franz Eberhard Wittig. *Zeitschrift für Metallkunde,* v. 43, May 1952, p. 158-161.

Proposes improvements in the experimental set-up customary for investigations of heat fusion. The improvement is achieved mainly by using a control device developed by the author. Results achieved by the new method. Tables and diagrams. 13 ref. (P12, Al, Ge)

417-P. (Russian.) **Certain New Laws Connecting Values of Losses to Coercive Force.** N. S. Akulov and T. A. Elkina. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Mar. 21, 1952, p. 377-379.

A theoretical discussion. Conclusions are confirmed by experimental data on cobalt, 45% and 78% Permalloys, Alsifer, and a steel of unspecified composition. (P16, Co, ST, Ni, Fe)

418-P. (Russian.) **The Behavior of Superconducting Films in Magnetic Fields.** V. L. Ginzburg. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Mar. 21, 1952, p. 385-388.

A theoretical discussion. Graphical interpretation. (P15, P16)

419-P. (Russian.) **Magnetization Curves of Plastically Deformed Iron in Strong Fields.** N. S. Akulov and K. M. Bol'shova. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Apr. 21, 1952, p. 817-819.

Armco iron and an Fe alloy containing 4% Mo were used in experimental determination. Data are charted. (P16, Fe)

420-P. (Russian.) **Ferromagnetic Resonance in Parallel Wires.** V. K. Arkad'ev and A. G. Kotov. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Apr. 21, 1952, p. 821-824.

Iron and nickel wires were used in investigation of the above. Data are charted. (P16, Fe, Ni)

421-P. (Russian.) **Interphase Tension at the Boundary of Unmixed Liquid Metals.** P. V. Gel'd and S. K. Chuchmarev. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Apr. 21, 1952, p. 877-880.

The interphase tension between molten Pb and Zn was measured experimentally. Data are tabulated and illustrated. 14 ref. (P10, Pb, Zn)

422-P. (Russian.) **Fluidity of Ferrous Alloys.** N. N. Kurnakov and M. Ia. Troneva. "Izvestiia Sektora Fiziko-Khimicheskogo Analiza", v. 20 (Academy of Sciences of the USSR), p. 66-75.

A study was made of fluidity in the Fe-Si, Fe-P, and Fe-Cr systems. Data are tabulated and charted. 37 ref. (P10, Fe, Si, Cr)

423-P. Surface Losses in Electromagnetic Cavity Resonators. I. Paghis. *Canadian Journal of Physics,* v. 30, May 1952, p. 174-184.

In a study of the relation between surface roughness and resonator losses, effective skin resistance of brass was determined at microwave frequencies, by means of Q measurements. Micrographs, tables, graphs, and apparatus diagrams. 14 ref. (P16, S15, Cu)

424-P. The ABC's of Germanium. J. P. Jordan. *Electrical Engineering,* v. 71, July 1952, p. 619-625.

Germanium is one of the most important elemental semiconductors. Some of the mechanisms governing its behavior are presented in a simplified manner as background for the understanding of the physics of the industrial devices utilizing it. (P15, Ge)

425-P. Absorption of 2-Mev Constant Potential Roentgen Rays by Lead and Concrete. W. W. Evans, R. C. Granke, K. A. Wright, and J. G. Trump. *Radiology,* v. 58, April 1952, p. 560-567.

The Cu absorption curve and the half-value layer in Cu, Pb, and concrete were measured for these supervoltage rays and compared with the closely equivalent, though less intense, gamma rays from radioactive sources. The transmission of 2-million-volt constant potential X-rays through barriers of Pb and concrete was determined for both small and large beams. Absorption characteristics of Al. Graphs and tables. (P10, Pb, Cu, Al)

426-P. Gamma-Ray Absorption Coefficients. Charlotte Meaker Davisson and Robley D. Evans. *Reviews of Modern Physics,* v. 24, Apr. 1952, p. 79-107.

Absorption of radiation in the energy range 0.1-6 Mev. Results of the theories of Compton effect, photo-electric effect, and pair production are given in the form of equations, tables, and curves. Necessary considerations in studying absorption coefficients; results of various workers compared with theory. Concludes that, in this energy range, present theories give values of absorption coefficients which are in good agreement with those obtained experimentally. Includes tabular and graphical data for specific elements, including C, Fe, Al, Cu, Ag, Sn, Ta, Pt, and Pb. 64 ref. (P10)

427-P. Heterogeneity of Metal Surfaces. M. Boudart. *Journal of the American Chemical Society,* v. 74, July 20, 1952, p. 3556-3561.

Some consequences of induction in connection with problems in chemisorption and catalysis. The nature of "active centers" on a metal surface. 39 ref. (P13)

428-P. The Heats of Combustion of Thorium and Uranium. Elmer J. Huber, Jr., Charles T. Holley, Jr., and E. H. Meierkord. *Journal of the American Chemical Society,* v. 74, July 5, 1952, p. 3406-3408.

Precise measurements of the heats of combustion of Th, U, and UO_2 were made and, from the results, heats of formation of ThO_2, UO_2, and U_3O_8 were calculated. (P12, Th, U)

429-P. The Grain Boundary Energy, Its Measurement and Influence Upon the Properties of Metals and Alloys. T. B. Massalski. *Journal of the Birmingham Metallurgical Society,* v. 32, June 1952, p. 38-59.

Experimental and theoretical evidence referring to origins, variation, and action of the energy associated with various grain boundaries and surfaces. Theories of the nature of the grain-boundary structure. Diagrams and graphs. 27 ref. (P12, M27)

430-P. Magnetostriction of Some Ferromagnetic Alloys. E. W. Lee. *Journal of the Iron and Steel Institute,* v. 171, June 1952, p. 160-164.

A simple apparatus which com-

prises a double roller and mirror system is capable of giving accurate measurements of magnetostriction of ferromagnetic rods. The apparatus was used to study the magnetostriction of some alloys, including the Ni-Co system. Temperature coefficients of magnetostriction of four Ni alloys were measured. Data are given for Co, 4 Ni-Fe alloys; 2 Ni-Si alloys; Monel; Mangonic; and 8 Ni-Co alloys. Apparatus diagram and graphs. 15 ref.
(P16, Ni, Co, Fe, SG-n, p)

431-P. The Thermodynamics of Substances of Interest in Iron and Steel Making. III. Sulphides. F. D. Richardson and J. H. E. Jeffes. *Journal of the Iron and Steel Institute,* v. 171, June 1952, p. 165-175.

A survey of available data on thermodynamics of sulfides and of gaseous sulfur compounds of interest in iron and steelmaking. The results are plotted on free-energy vs. temperature diagrams, and equations and likely accuracies are quoted for each substance. 66 ref. (P12, Fe, ST)

432-P. Magnetic Properties, Internal Strains and the Bauschinger Effect in Metals. D. V. Wilson. *Nature,* v. 170, July 5, 1952, p. 30-31.

Diagram summarizes results showing that, in the case of a heat treated 0.88% C steel, change in indentation hardness which results from a moderate degree of deformation is dependent on microstructure. Up to a certain limit, with increasing initial hardness, magnitude of the softening effect increases progressively. At higher hardness values, observed softening is less, although initial internal strain energy continues to increase with hardness. Martensite tempered below about 140° C. does not show the softening effect. A possible explanation of these effects. (P16, Q25, CN)

433-P. Thermal and Electrical Conductivity of Porous Metals Made by Powder Metallurgy Methods. P. Grootenhuis, R. W. Powell, and R. P. Tye. *Proceedings of the Physical Society,* v. 65, sec. B, July 1, 1952, p. 502-511.

Measurements of thermal conductivity and electrical resistivity over the range of 20-200° C. are reported for several specimens of a sintered porous bronze material (89% Cu, 11% Sn). Suggestions are made for estimating the thermal conductivities of similar porous materials. Graphs. 21 ref. (P11, P15, Cu)

434-P. Heat Transport in Lead-Bismuth Alloys. J. L. Olsen. *Proceedings of the Physical Society,* v. 65, sec. A July 1, 1952, p. 518-532.

Variation with temperature and with magnetic field of the heat conductivity of a series of Pb-Bi alloys was measured. Estimates were made from the experimental data of the processes contributing to the heat conductivity, and of resistances due to the various scattering mechanisms limiting these conductivities. Numerous graphs. 17 ref.
(P11, Pb, Bi)

435-P. Infra-Red Absorption by Metals at Low Temperatures. K. G. Ramanathan. *Proceedings of the Physical Society,* v. 65, sec. A, July 1, 1952, p. 532-540.

The infrared absorptivities of several electropolished metal surfaces were measured at liquid-He temperatures with a specially designed radiation cryostat with a black body at room temperature as the source and a differential He-gas thermometer as the detector. The absorptivities of the normal metals, which include a number of alloys, are compared with values calculated by various theories of metallic reflection. Diagrams and tables. (P17)

436-P. The Spectral Emissivities of Iron, Nickel, and Cobalt. H. Lund and L. Ward. *Proceedings of the Physical Society,* v. 65, sec. B, July 1, 1952, p. 535-540.

Spectral emissivities were measured by direct comparison of surface and black-body radiation between 1000 and 1300° C. over the wavelength range of 1.0-2.6μ using a PbS cell and amplifier as the detecting unit. Diagrams, tables and graphs. 13 ref. (P17)

437-P. A Note on the Theory of Conduction in Metals. E. H. Sondheimer. *Proceedings of the Physical Society,* v. 65, sec. A, July 1, 1952, p. 561-562.

Considers various theories and points out cases where the conventional idea does not apply. Implications of the new theory as applied to the properties of bismuth.
(P11, Bi)

438-P. The Thermal Conductivity of Metals at Low Temperatures. E. H. Sondheimer. *Proceedings of the Physical Society,* v. 65, sec. A, July 1, 1952, p. 562-564.

The theory of thermal conductivity is compared with experimental results reported by recent investigations. (P11)

439-P. Measurement of the Thermal Accommodation Coefficients of Gases. A. E. J. Eggleton, F. C. Tompkins, and D. W. B. Wanford. *Proceedings of the Royal Society,* ser. A, v. 213, June 24, 1952, p. 266-273.

Relates partly to the chemisorption of gases on metals. Theoretical and experimental checks were made on the techniques of Roberts and Bremmer. Experimental values for neon at a tungsten surface. Apparatus diagrams and graphs. (P13, W)

440-P. Interphase Interfaces. Cyril Stanley Smith. "Imperfections in Nearly Perfect Crystals," (John Wiley & Sons, New York), 1952, p. 377-401.

Values for interfacial free energy for interfaces involving one solid and a second solid or liquid phase. The data are fragmentary. Additional data, mostly from alloy systems, are tabulated, showing the ratio between two solid-solid interfaces, one of which is usually a grain boundary. Shows experimentally that energy of the interface between two different crystal lattices in metallic phases is almost invariably lower than energy of a grain boundary between two crystals of the same phase differing only in orientation. 12 ref. (P10)

441-P. Surface and Interfacial Tensions of Single-Phase Solids. J. C. Fisher and C. G. Dunn. "Imperfections in Nearly Perfect Crystals" (John Wiley & Sons, New York), 1952, p. 317-343; disc., p. 343-351.

Published values of surface and interfacial tensions of single-phase solids are collected, evaluated, and tabulated. Several errors in the literature are corrected. Reasonably good values are obtained for the surface tensions of solid Cu, Ag, and Au, for the grain and twin boundary tensions in Cu, and for the variation in grain-boundary tension with orientation of adjacent grains in silicon iron, Sn, and Pb. 51 ref. (P10, Cu, Ag, Fe, Sn, Pb)

442-P. (English.) **On the Structure and Properties of Some Metal and Metal Oxide Films.** Georg Hass and Noel W. Scott. *Centre National de la Recherche Scientifique,* "Les Properiétés Optiques des Lames Minces Solides", 1950, p. 90-98.

Electron-microscope study of the structure and optical properties of vacuum-deposited Ag, Al, Ge, Si, and SiO films. Results charted and illustrated. (P17, M26, L25, Ag, Al, Ge, Si)

443-P. (English.) **Some Current Developments in Multilayer Optical Films.** A. F. Turner. *Centre National de la Recherche Scientifique,* "Les Proprietes Optiques des Lames Minces Solides," 1950, p. 140-156.

Achromatic anti-reflection coatings; cold mirrors; selective metallic reflectors; interference filters with multiple dielectrics; and frustrated total-reflection filters. (P17)

444-P. (French.) **Graphical Study of the Optical Properties of Thin Metallic Films.** D. Malé. *Centre National de la Recherche Scientifique,* "Les Propriétés Optiques des Lames Minces Solides", 1950, p. 28-32. (P17)

445-P. (French.) **Optical Properties of Thin Films of Silicon.** P. Cotton. *Centre National de la Recherche Scientifique,* "Les Propriétés Optiques des Lames Minces Solides,' 1950, p. 71-75.

Preparation by vacuum deposition. Apparatus diagrammed; results charted and illustrated. (P17, L25, Si)

446-P. (French.) **Evolution of Certain Optical Properties of Very Thin Metallic Films.** M. Perrot. *Centre National de la Recherche Scientifique,* "Les Propriétés Optiques des Lames Minces Solides", 1950, p. 81-85.

Vacuum apparatus used. Results of study of Ag films on glass. (P17, Ag)

447-P. (French.) **Optical Properties of Thin Platinum Films and Their Comparison With Those of Other Metals.** P. Rouard. *Centre National de la Recherche Scientifique,* "Les Propriétés Optiques des Lames Minces Solides", 1950, p. 86-89.

Study of very thin films of Pt deposited on glass shows the existence of a very distinct minimum of the glass-metal reflection factor for a thickness of about 25 A. (P17, Pt)

448-P. (French.) **Theoretical Study of Quintuple Layers of the Type Ag-MgF_2-Ag-MgF_2-Ag.** Ch. Dufour. *Centre National de la Recherche Scientifique,* "Les Proprietes Optiques des Lames Minces Solides," 1950, p. 109-113.

Theory of the interferometric combination formed by the coupling of two Fabry-Perot standards (with two films fused into one) can be applied to 5-fold thin films of the type: metal, nonabsorbing film, metal, non-absorbing film, metal. Such complex films can form monochromatic interference filters if certain conditions are fulfilled. (P17, Ag)

449-P. (English.) **The Reflectivity of Thin Silver Films and the Performance of the Fabry-Perot Interferometer.** H. Kuhn. *Centre National de la Recherche Scientifique,* "Les Proprietes Optiques des Lames Minces Solides," 1950, p. 118-120. (P17)

450-P. (French.) **Optical Properties of Thin Solid Films.** P. Cotton and P.

Rouard. *Centre National de la Recherche Scientifique,* "Les Proprietes Optiques des Lames Minces Solides", 1950, p. 157-175.

A classified review. Preparation, properties and applications. 248 ref. (P17, L25)

451-P. (German.) **Melting of Cadmium.** Lucie Apelt. *Metalloberfläche,* ser. B, v. 4, July 1952, p. B107-B108.

Vapor-pressure curve for Cd. Significance of observations in comparison with other metals. (P12, E10, Cd)

452-P. (German.) **Behaviour of Molybdenum and Nickel and Some Molybdenum-Nickel-Alloys in Acid Electrolytes.** Georg Masing and Günther Roth. *Werkstoffe und Korrosion,* v. 3, May-June 1952, p. 176-186; July 1952, p. 253-262.

Potential of the Mo electrode depends on pH. This dependence is explained in analogy to Sb. In anodic dissolution, if current density is not too small, Mo follows the relation of Tafel. Divergences are explained. A method for indirect measurement of oxygen-depolarization of different metals permits absolute determination of dissolved O_2 in the electrolyte by electrochemical means. From the results, acid resistance of Mo and its alloys can be explained. Second part deals especially with Ni and Ni-Mo alloys, and with a method for measuring the role of oxygen in corrosion. 65 ref. (P15, R2, Ni, Mo)

453-P. (French.) **Hall Effect of Iron and Nickel at Low Temperatures.** J. P. Jan and H. M. Gijsman. *Physica,* v. 18, May 1952, p. 339-355.

Hall effect was measured at 14, 20, 64, 83, and 293° K. Hall electric field per unit current density was plotted as a function of magnetic induction in the sample. "Extraordinary" Hall constant, as well as field parameter, was determined. Experiments show that a new parameter, transverse electro-magnetic conductivity, has a temperature variation simpler than the classical Hall constant. 16 ref. (P15, Fe, Ni)

454-P. (German.) **Gases in Metals.** P. Bardenheuer. *Metall,* v. 6, July 1952, p. 351-356.

The solubility of gases in metals, particularly the role of hydrogen. Gas absorption of metals, and effects of reaction gases. Degasification of metal melts. Data are charted. 11 ref. (P12, E25)

455-P. (German.) **Pyrophoric Metals.** D. A. Pospekhov. *Metall,* v. 6, July 1952, p. 371-374. *(Translated from Zhurnal Prikladnoi Khimii.)*

Previously abstracted from original. See item 3A-126, 1949. (P11)

456-P. (German.) **The Iron-Chlorine System. II. The Equilibrium of the Reaction $FeCl_2$ (Gas) + H_2 = Fe + 2HCl.** Harald Schäfer and Kurt Krehl. *Zeitschrift für anorganische und allgemeine Chemie,* v. 268, No. 1-2, 1952, p. 35-46.

Includes thermodynamic computation of reactions of α, β, and γ-iron and $FeCl_2$. Graphs, and tables. 19 ref. (P12, P13, Fe)

457-P. (Russian.) **Solubility of Nitrogen in Iron-Chromium Alloys.** K. T. Kurochkin, P. V. Gel'd, and V. I. Iavoiskii. *Doklady Akademii Nauk SSSR, new ser.,* v. 84, May 11, 1952, p. 329-332.

A study was made using alloys with 3.56-66% Cr and N_2 pressures of 512 and 735 mm. of Hg at temperatures of 1500 and 1670° C. Data are tabulated and charted. (P13, Fe)

458-P. (Swedish.) **Three-Dimensional Space Representation of Free Energy in Ternary Systems.** Erik Rudberg. *Jerkontorets Annaler,* v. 136, No. 5, 1952, p. 91-112.

The general properties of the Gibbs' free-energy function for ternary systems, particularly in relation to geometric representation as a series of single-phase curved surfaces suspended above the composition triangle. The various equilibrium characteristics of such systems, and the trend of reactions in non-equilibrium situations, are governed by the downward convexity exhibited by these surfaces over stable phase regions. (P12)

459-P. Permanent Magnets From Powdered Iron. B. Kopelman. *Electrical Manufacturing,* v. 50, Aug. 1952, p. 88-91, 328.

See abstract of "Permanent Magnets from Ultrafine Iron Powder," *Electrical Engineering,* item 263-P, 1952. (P16, H general, Fe, SG-n)

460-P. The Electrical Resistance of Binary Metallic Mixtures. Rolf Landauer. *Journal of Applied Physics,* v. 23, July 1952, p. 779-784.

A theory for a random mixture, based on the assumption that each crystal acts as if surrounded by a homogeneous medium whose properties are those of the mixture. Comparisons with experiment. 18 ref. (P15)

461-P. Superconductivity in the Cobalt-Silicon System. B. T. Matthias.

Physical Review, ser. 2, v. 87, July 15, 1952, p. 380.

A Co-Si melt with 75% Si was found to become superconducting at 1.33° K. X-ray analysis shows two phases: pure Si and $CoSi_2$, in roughly equal proportions.
(P15, Co, Si)

462-P. Single-Crystal Germanium. G. K. Teal, M. Sparks, and E. Buehler. *Proceedings of the I.R.E.,* v. 40, Aug. 1952, p. 906-909.

The single-crystal Ge now being employed for transistors and for the parallel development of a variety of rectifier and photocell devices. Graphs. 12 ref. (P15, Ge)

463-P. Properties of Metals Below −300 F. W. T. Ziegler. *Refrigerating Engineering,* v. 60, Aug. 1952, p. 848-852; disc., p. 852.

Mechanical properties; specific heat; thermal expansion; electrical conductivity; and thermal conductivity. Graphs and 25 ref.
(P11, P12, P15, Q general)

464-P. Navy Develops New Permanent Magnetic Material. *Steel,* v. 131, July 28, 1952, p. 76-77.

An alloy of manganese bismuthide and unreacted Mn and Bi have the highest recorded coercive force of any known permanent-magnet material. Magnets are made by powder-metallurgy techniques.
(P16, H general, Mn, Bi, SG-n)

465-P. Solutions in Liquid Iron. Part 2. The Influence of Sulphur on the Solubility and Activity Coefficient of Carbon. J. A. Kitchener, J. O'M. Bockris, and D. A. Spratt. *Transactions of the Faraday Society,* v. 48, July 1952, p. 608-617.

The solubility of graphite in liquid iron was measured from 1200-1700° C. with addition of 0-1.4% S. Thermodynamic and structural significance of the results. Graphs and tables. 21 ref. (P12, Fe)

466-P. (English.) **The Change of Conductivity of Metals in Strong Magnetic Fields.** Yasaku Tanabe. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Feb. 1951, p. 91-106.

Change of resistance in a transverse magnetic field was studied in strong magnetic fields at room temperature. The metals studied were Te, Ce, Sb, Fe, Co, and Ni. It was found that there is a distinct difference in the change of resistance between ordinary and ferromagnetic metals. The difference was found to be caused by the fundamental difference in origin of the conduction electrons.
(P16, Te, Ce, Sb, Fe, Co, Ni)

467-P. (English.) **On the Width of Forbidden Energy Zone of Tellurium.** Tadao Fukuroi. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Apr. 1951, p. 175-181.

The zone for pure Te at the absolute zero of temperature, and its variation resulting both from thermal dilation and from thermal vibration induced in the crystal lattice when the temperature is increased. (P12, M26, Te)

468-P. (English.) **On the Vibrational Spectrum and the Vibrational Specific Heat of a Binary Superlattice Alloy.** Yoshio Shibuya, Yoshüchi Fukuda, and Tadao Fukuroi. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Apr. 1951, p. 182-186.

Houston's approximate method of finding the frequency distribution function was applied to calculation of vibrational specific heat of β-brass in the state of any specified degree of order. It is shown that the vibrational specific heat of the disordered alloy is generally larger than that of the ordered one at ordinary temperatures. (P12, Cu)

469-P. (English.) **Fundamental Researches on Smelting of Sulphide Ores. VIII. On the Equilibrium in the Reduction of Solid Stannous Sulphide by Hydrogen Gas.** Kingo Sudo. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Apr. 1951, p. 187-193.

Equilibrium was measured by a flow method and equilibrium constants determined between 533 and 679° C. Experimental results are summarized in empirical equations. Heat and standard free-energy changes for the formation of solid SnS from the elements at room temperature are calculated.
(P12, C21, Sn)

470-P. (English.) **Reduction Equilibria of Iron Oxides. III. Measurement of the Equilibrium of the Reaction.** Koji Sanbongi. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Apr. 1951, p. 194-200.

Equilibrium was measured in the range 1530-1670° C. and an equation was obtained for the temperature function of the equilibrium constant. Dissociation pressure of molten FeO was calculated. (P12, D general, Fe)

471-P. (French.) **Combustion of Aluminum in Air.** René de Salins. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, June 16, 1952, p. 2437-2439.

Combustion experiments with Al powder in air, by means of a sta-

tionary flame. Details of the experiments. Flame-spectra lines are tabulated and discussed. (P17, Al)

472-P. (French.) **Charges in the Electrical Conductivity of Metals During Their Fusion.** Genevieve Sutra. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, June 30, 1952, p. 2589-2591.

Electrical conductivity undergoes an abrupt change at the melting point. Contrary to present opinion, it is shown that this variation is definitely related to volume variation. Data for various metals are tabulated and charted. (P15)

473-P. The Metal Germanium and Its Use in the Electronics Industry. Anthony S. Rugare. *Metal Progress,* v. 62, Aug. 1952, p. 97-103.

Production, properties, and applications—mainly as a semi-conductor, processing of Ge billets, "doping" with "donor" (As, Sb, P, or Bi) or "acceptor" (Al) materials, and heat treatment. Crystal and atomic structure and theory of semiconductors as applied to Ge. (P15, T1, M25, M26, Ge)

474-P. (Book) **Ferromagnetic Properties of Metals and Alloys.** K. Hoselitz. 317 pages. 1952. Oxford University Press, 114 5th Ave., New York 11, N. Y.; or Amen House, London E.C. 4, England. $8.00.

Comprehensive account of present-day theories of the magnetization curve. Attempts to demonstrate the connection between properties obtained in practice and existing theoretical explanations. The composition and properties of soft magnetic materials, as well as those of magnetic analysis for determination of constitution and structure of ferromagnetic metals and alloys. The potential application of magnetic methods to metallurgical problems. (P16, M27, SG-n, p)

475-P. (Book) (French.) **Les Propriétés Optiques des Lames Minces Solides.** (Optical Properties of Thin Solid Films.) 176 pages. 1950. Centre National de la Recherche Scientifique, 45 Rue d'Ulm, Paris 5, France.

A collection of articles by American, British, and French scientists. Theoretical research, various techniques for the preparation of films, experimental research on optical properties, and diversified applications. Presented at Marseille, Apr. 19-23, 1949. Selected papers are separately abstracted. (P17, L25)

476-P. The Electrokinetics of Hydrogen Evolution. III. Hydrogen Overvoltage at Electrodeposited Copper Cathodes. William P. Senett and C. F. Hiskey. *Journal of the American Chemical Society,* v. 74, Aug. 5, 1952, p. 3754-3760.

Includes overvoltage measurements as a function of current density and temperature, and a study of time variations. Theory. Tables, graphs, and apparatus diagram. 14 ref. (P15, Cu)

477-P. Studies on Some Metal Electrodes. Part IX. The Temperature Coefficients of the Copper and Antimony Electrodes in Solutions Initially Free From Their Ions. The Mode of Oxidation of These Metals. A. Riad Tourky and E. M. Khairy. *Journal of the Chemical Society,* July 1952, p. 2626-2633.

Results are discussed in the light of the theory of lattice defects. (P15, R2, Cu, Sb)

478-P. A New Calculation of Some Properties of Metallic Beryllium. B. Donovan. *Philosophical Magazine,* ser. 7, v. 43, Aug. 1952, p. 868-874.

A quantum mechanical calculation of lattice constant, compressibility, cohesive energy, and work function of Be was carried out, using an extension of the cellular method of Wigner and Seitz. With exception of work function, the results agree satisfactorily with experiment and compare favorably with values obtained by more elaborate methods. Graphs. 14 ref. (P10, P15, Be)

479-P. The Electrical Resistance of Magnesium, Aluminium, Molybdenum, Cobalt, and Tungsten at Low Temperatures. J. G. Thomas and E. Mendoza. *Philosophical Magazine,* ser. 7, v. 43, Aug. 1952, p. 900-910.

Measurements of resistance in zero magnetic field; magnetoresistance and susceptibility. Graphs. 23 ref. (P15, Mg, Al, Mo, Co, W)

480-P. The Extra Electrical Resistance Due to Cold Work and Neutron Irradiation of Platinum. R. A. Dugdale. *Philosophical Magazine,* ser. 7, v. 43, Aug. 1952, p. 912-914.

Results of recent experiments on fixing of the extra resistance produced in Pt wire by cold work and by neutron bombardment. (P15, Pt)

481-P. The Coherent Neutron Scattering Cross Sections of Nitrogen and Vanadium. S. W. Peterson and Henri A. Levy. *Physical Review,* ser. 2, v. 87, Aug. 1, 1952, p. 462-463.

Neutron-diffraction measurements on vanadium nitride, vanadium carbide, and potassium azide show the coherent neutron scattering cross section of nitrogen to be 11.1 ± 0.3 barns, positive phase; and that of vanadium to be 0.029 ± 0.01 barn, negative phase. 11 ref. (P10, V)

482-P. Some Post-War Developments in Magnetism. L. F. Bates. *Proceedings of the Physical Society,* v. 65, sec. A, Aug. 1, 1952, p. 577-594.

A survey. 18 ref. (P16, SG-n, p)

483-P. Analysis of Polarized Light Reflected From Absorbing Materials at Normal Incidence. J. Woodrow, B. W. Mott, and H. R. Haines. *Proceedings of the Physical Society,* v. 65, sec. B, Aug. 1, 1952, p. 603-616.

Expressions derived for intensity of analyzed light reflected from absorbing crystals under crossed polarizing units and with the analyzer slightly rotated from the crossed position. Relationships are illustrated by experimental curves on specimens of Sn, U, Bi, and stibnite. Graphs. 13 ref. (B17, Sn, U, Bi)

484-P. The Magneto-Resistance of Ferromagnetic Al-Si-Fe Alloys. R. Parker. *Proceedings of the Physical Society,* v. 65, sec. B, Aug. 1, 1952, p. 616-620.

By extending the treatment in an earlier paper, an equation is derived for saturation magneto resistance of mixed ferromagnetic alloys as a function of composition and temperature. Results are in agreement with experiment for the Al-Si-Fe alloy system.
(P16, Al, Si, Fe, SG-n, p)

485-P. Transparent Conducting Films. E. J. Gillham and J. S. Preston. *Proceedings of the Physical Society,* v. 65, sec. B, Aug. 1, 1952, p. 649.

Results of observations on very thin gold films on glass and on oxide substrates, with respect to resistivity and optical properties.
(P15, P17, Au)

486-P. Area Contacts on Germanium. J. W. Granville and H. K. Henisch. *Proceedings of the Physical Society,* v. 65, sec. B, Aug. 1, 1952, p. 650-651.

Observations of Au contacts applied by evaporation in a vacuum to n-type germanium of 5 ohm-cm. resistivity and a Hall coefficient of about 10^4 cc. per coulomb. Graphs.
(P15, Ge, Au)

487-P. Contact Properties of p-Type Germanium. J. W. Granville, H. K. Henisch, and P. M. Tipple. *Proceedings of the Physical Society,* v. 65, sec. B, Aug. 1, 1952, p. 651-652.

Results of experimental study.
(P15, Ge)

488-P. Influence of Added Elements and Condition of Graphite Upon Electrical Resistance of Cast Iron. Ichiro Iitaka and Kazuhiko Sekiguchi. *Reports of the Casting Research Laboratory,* No. 3, 1952, p. 23-25.

Results of experiments charted, tabulated, and discussed. (P15, CI)

489-P. (German.) **The Conductivity of Pure Copper and the Effects of Additions on This Conductivity.** F. Pawlek. *Metall,* v. 6, Aug. 1952, p. 434-435.

Conductivity of 99.997% pure sintered Cu wire, and increases in conductivity caused by small additions of Fe, Sb, Pb, As, Ni, Si, P, Ag, and Cd were determined. Details of the experiments; data are charted. (P15, Cu)

490-P. (German.) **Electrochemical Transformations in Friction Systems at Elevated Temperatures, and Their Influence on Wear in Machines.** H. Schiffers. *Metalloberfläche,* sec. A, v. 6, Aug. 1952, p. A120-A124.

The mechanism of friction, and the special conditions existing in machinery. Electrochemical transformations and laws governing these transformations. Data are tabulated. 14 ref. (P15, Q9)

491-P. (German.) **Density Measurements on Molten Germanium and Tellurium.** W. Klemm, H. Spitzer, W. Lingenberg, and H. J. Junker. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften,* v. 83, No. 3, 1952, p. 629-637.

The distinction between metals, "meta" metals, semiconductors, and nonmetals. On the nonmetallic side of the metal-nonmetal boundary, there are especially large interstitial lattice spaces which always are reduced in volume upon melting, after expanding upon melting. The volume of Te contracts again when the melting process is completed. Tables, diagrams, graphs. 15 ref.
(P10, N12, Ge, Te)

492-P. Study of Metal-Ceramic Interactions at Elevated Temperatures. F. H. Norton and W. D. Kingery. *U. S. Atomic Energy Commission,* NYO-3139, Apr. 1, 1952, 65 pages.

Reviews literature pertaining to carbide, nitride, and sulfide reactions with metals. Samples of nitrides and carbides were prepared for use in reaction and surface-tension studies. Surface tension and wettability data for Fe, Ni, and Si on ceramic oxides. Additional improvements and tests of a microscopic furnace for sintering studies. Preparation of spherical particles of alumina and zirconia.
(P10, H10, H15, Fe, Ni, Si, C-n)

493-P. Vibralloy—a New Ferromagnetic Alloy. M. E. Fine. *Bell Laboratories Record,* v. 30, Sept. 1952, p. 345-348.

Cold-worked Fe-Ni alloys containing 9% Mo whose temperature coefficient of elastic modulus may be controlled over a wide range. Also

they have substantial ferromagnetic permeability and high mechanical strength. Graphs show variation of Young's modulus and permeability with temperature and composition. (P16, Q21, Fe, Ni, SG-n, p)

494-P. Ultrathin Magnetic Alloy Tapes With Rectangular Hysteresis Loops. M. F. Littmann. *Electrical Engineering,* v. 71, Sept. 1952, p. 792-795.

The alloys chosen for study were those having high permeability and relatively high resistivity to minimize eddy-current effects. They were as follows: 3% Si iron; 48% Ni + 52% Fe; 79% Ni + 4% Mo + 17% Fe; and 79% Ni + 5% Mo + 16% Fe. They were rolled to thicknesses between ⅛ and 1 mil. D.C. magnetization curves, hysteresis loops, and variation of ratio of residual to maximum induction with magnetizing force for ¼-mil cores are charted. (P16, Fe, Ni, SG-n, p)

495-P. Electrical Contact Resistance Between Metallic Surfaces Subjected to Various Treatments. T. Fukuroi and Y. Muto. *Engineers' Digest,* v. 13, Aug. 1952, p. 261-262. (Condensed from *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, June 1951, p. 281-291).

Test apparatus and experimental results obtained with tungsten rods subjected to the following treatments: mechanical polishing, electropolishing, and electrolytic etching. Diagrams and tables. (P15, W)

496-P. How Ferromagnetism Works. R. H. Esling. *Iron Age,* v. 170, Sept. 11, 1952, p. 148-152.

Basic principles of ferromagnetism for understanding varied equipment such as electric generators and motors, lifting magnets, solenoids in switches and valves, and permanent-magnet applications. Diagrams. (P16, ST)

497-P. Measurement of the Internal Energy in Copper Introduced by Cold Work. Benjamin Welber. *Journal of Applied Physics,* v. 23, Aug. 1952, p. 876-881.

Interpretation of a determination made on the ratio of stored energy to the energy expended in cold working Cu by twisting. Ratios of about 0.03 were found in three cylindrical samples which were cold worked to the extent of 8-12 cal. per g. 17 ref. (P12, Q24, Cu)

498-P. Phosphorus-Oxygen Equilibria in Liquid Iron. J. B. Bookley, F. D. Richardson, and A. J. E. Welch. *Journal of the Iron and Steel Institute,* v. 171, Aug. 1952, p. 404-412.

Study of thermodynamics of the P-O_2 equilibrium in liquid Fe by bringing the P content of liquid Fe to equilibrium with a mixture of tetracalcium phosphate ($Ca_4P_2O_9$) and CaO, and a controlled-gas atmosphere of water vapor and H_2. Graphs. 11 ref. (P12, Fe)

499-P. Effect of Manganese on the Activity of Sulphur in Liquid Iron and Iron-Carbon Alloys. J. P. Morris. *Journal of Metals,* v. 4, Sept. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 939-940.

Experimental procedure and results of study. Tables and graphs. (P12, Fe)

500-P. Heats of Solution of Group I-B Metals in Liquid Tin. L. B. Ticknor and M. B. Bever. *Journal of Metals,* v. 4, Sept. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 941-945.

An isothermal calorimeter for measurements of heats of solution in liquid tin. Measurements of the heats of solution of Au, Ag, Cu, and an Au-Ag alloy; and heat of formation of Au-Ag alloys. Tables and diagrams. 13 ref. (P12, Au, Ag, Cu)

501-P. The Specific Heats of Several Metals Between 1.8° and 4.2° K. I. Estermann, S. A. Friedberg, and J. E. Goldman. *Physical Review,* v. 87, Aug. 15, 1952, p. 582-588.

Specific heats of Mg, Ti, Zr, and Cr were measured between 1.8° and 4.2° K by the vacuum calorimeter method. Electronic contribution to specific heats of these metals was in agreement with the Sommerfeld theory and with results of recent detailed calculations of energy bands in transition metals. (P12, Mg, Ti, Zr, Cr)

502-P. Measurements on the Temperature, Current, Magnetic Field. Phase Diagram of Superconductivity. K. Mendelssohn, C. Squire, and Tom. S. Teasdale. *Physical Review,* v. 87, Aug. 15, 1952, p. 589-591.

Experiments were carried out to investigate the existence of a paramagnetic effect, at the transition to superconductivity. Work deals with induction measurements at constant values of magnetic field, current, and temperature. Diagrams and graphs. (P16, M24)

503-P. Carriers of Electricity in Metals Exhibiting Positive Hall Effects. Sheldon Brown and S. J. Barnett. *Physical Review,* v. 87, Aug. 15, 1952, p. 601-607.

Momentum associated with current in metals was measured under conditions in which they are known to have positive Hall coefficients.

A coil of the wire was supported with its axis vertical. Extremely small deflections resulting from inertial effect of successive reversals of current were measured by a resonance method. Phototube and oscilloscope method for measuring both amplitude and phase of small deflections. (P15)

504-P. Progress in Core Material for Small Transformers. C. C. Horstman. *Westinghouse Engineer,* v. 12, Sept. 1952, p. 160-163.

Emphasis on Si steel (Hipersil) cores. Magnetic and electrical properties are charted. Fabrication equipment and procedures. (P15, P16, G general, AY)

505-P. (French.) **Dilatometric Study of Metallic Gadolinium.** Felix Trombe and Marc Foex. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 235, July 7, 1952, p. 42-44.

Metallic Gd was investigated at temperatures between −195 and 300° C. Results are charted and interpreted. (P11, Gd)

506-P. (German.) **Studies on the Anodic Behavior of Nickel.** I. G. Trümpler and Hch. Meyer. *Helvetica Chimica Acta,* v. 235, No. 4, 1952, p. 1304-1310.

Experimental arrangement and results of investigation. Apparatus described makes it possible to follow the transition from an active state to a strongly passive one, also the reverse process. (P15, Ni)

507-P. (German.) **Heat Transfer in Metal Melts in the Immediate Neighborhood of the Solid-Liquid Phase Boundary.** Otto Schaaber. *Zeitschrift für Metallkunde,* v. 43, July 1952, p. 251-258.

The stationary heat flow near the fusion points of Zn, Al, and KNO_3 in vertical and horizontal directions was investigated. Experimental details and results. Proposes an explanation for peculiarities of the flow observed in a horizontal direction. Charts and diagrams. 12 ref. (P11, N12)

508-P. (German.) **The Electrical Resistance of Thin Tin Films With Lattice Distortions.** Johannes Niebuhr. *Zeitschrift für Physik,* v. 132, No. 4, July 1952, p. 468-481.

Study with different Sn thicknesses and temperature. Theoretical explanation of increasing specific resistance with decreasing thickness. Graphs and tables. 21 ref. (P15, Sn)

509-P. (Russian.) **Investigation of Ferromagnetic Resonance in Cr-Te Alloys.** T. M. Perekalina. *Doklady Akademii Nauk SSSR,* new ser., v. 84, May 21, 1952, p. 475-476.

An experimental study of the Cr alloys containing 50 at.% Te. Data are charted. (P16, Cr, Te)

510-P. (Russian.) **The Influence of Halide Ions on the Adsorption of Organic Cations by the Surface of Iron.** Z. A. Iofa, E. I. Liakhovetskaia, and K. Sharifov. *Doklady Akademii Nauk SSSR,* new ser., v. 84, May 21, 1952, p. 543-546.

Data are tabulated and charted. 13 ref. (P13, Fe)

511-P. (Russian.) **Paramagnetic Resonance Absorption in Metals.** S. A. Al'tshuler, V. Ia. Kurenev, and S. G. Salikhov. *Doklady Akademii Nauk SSSR,* new ser., v. 84, June 1, 1952, p. 677-679.

Investigated for 20 nonferrous metals. Data are tabulated and charted. (P16, EG-a)

512-P. (Russian.) **Temperature Dependence of the Magnetic Strength of Iron-Nickel Alloys.** E. F. Kuritsyna. *Doklady Akademii Nauk SSSR,* new ser., v. 84, June 1, 1952, p. 687-688.

Fe-Ni alloys containing 35, 50, and 78.5% Ni were investigated. Data are charted. (P16, Fe, Ni)

513-P. (Russian.) **The Influence of Pressure on the Solubility of Molecular Hydrogen in the β-phase of the Palladium-Hydrogen System.** P. S. Perminov, A. A. Orlov, and A. N. Frumkin. *Doklady Akademii Nauk SSSR,* new ser., v. 84, June 1, 1952, p. 749-752.

An experimental study. Data are tabulated and charted. (P13, Pd)

514-P. (Russian.) **Adsorption and Solution of Hydrogen by Dispersed Palladium-Rhodium Alloys.** I. P. Tverdovskii and A. I. Stetsenko. *Doklady Akademii Nauk SSSR,* new ser., v. 84, June 11, 1952, p. 997-1000.

An experimental study. Data are charted. (P13, Pd, Rh)

515-P. (Russian.) **Study of Liquid Iron-Phosphorus Alloys by an Electromotive-Force Method.** O. A. Esin, L. K. Gavrilov, and N. A. Vatolin. *Doklady Akademii Nauk SSSR,* new ser., v. 85, July 1, 1952, p. 87-89.

The Fe-P system was studied in relation to melt-slag reactions. Data tabulated and charted. (P12, Fe, ST)

516-P. The Reactions of Titanium Tetraiodide on Heated Titanium and Tungsten Surfaces. T. R. Ingraham and L. M. Pidgeon. *Canadian Journal of Chemistry,* v. 30, Sept. 1952, p. 694-697.

A study in relation to refining problems. When TiI_4 is passed over a hot bar of Ti metal, reactions depend on whether temperature of bar is above or below 1100° C. If

temperature is below 1100° C., Ti is rapidly etched from bar to form TiI_2, which through further reaction with TiI_4 is converted to TiI_2. Above 1100° C., TiI_4 is decomposed to Ti and I_2. When a tungsten bar is used, etching and deposition reactions of Ti are separated. (P13, Ti, W)

517-P. Permanent Magnets Increase Capacity and Life of Switch Contacts. R. B. Immel. *Machine Design,* v. 24, Sept. 1952, p. 132-138.

Addition of permanent magnets to the contacts on d.c. switches provide an effective arc blowout field and greatly increases their interrupting capacity. This eliminates necessity for additional contactors and relays normally required to handle the circuits of standard manual master switches. Data for various Alnico compositions are charted. (P16, SG-n, Al, Ni, Co)

518-P. The Gyromagnetic Ratios of the Ferromagnetic Elements. G. G. Scott. *Physical Review,* ser. 2, v. 87, Sept. 1, 1952, p. 697-699.

Gyromagnetic ratios for Fe, Co, and Ni were determined by means of a technique involving a sensitive torsional pendulum. Results on Ni and Co. Tables. (P16, Ni, Co, Fe)

519-P. Gyromagnetic Ratios of Iron, Cobalt, and Many Binary Alloys of Iron, Cobalt, and Nickel. S. J. Barnett and G. S. Kenny. *Physical Review,* ser. 2, v. 87, Sept. 1, 1952, p. 723-734.

Gyromagnetic ratios were determined by measurements on the Einstein-de Haas effect as made in the Norman Bridge Laboratory. Improvements were made in method of eliminating large quadrature torques, in method of reducing disturbances due to vibrations of building, in method of frequency control, in design of square wave commutator, and in design of rotors. Photographs, graphs, and tables. (P16, Fe, Co, Ni)

520-P. The Magnetic Properties of Superconducting Alloys of Indium and Thallium. W. F. Love, E. Callen, and F. C. Nix. *Physical Review,* ser. 2, v. 87, Sept. 1, 1952, p. 844-847.

Magnetization curves for spherical samples of a series of alloys in the solid solution range of Tl in In were measured as a function of temperature and composition, and critical field curves were obtained. Graphs. (P16, In, Tl)

521-P. The Spectroscopy of the Solid State: Copper and Chromium. E. M. Gyorgy and G. G. Harvey. *Physical Review,* ser. 2, v. 87, Sept. 1, 1952, p. 861-862.

M_{23} emission curves of Cu and Cr were obtained by using a vacuum recording spectrograph. Tabulated results. (P17, Cu, Cr)

522-P. Optical Polarization in Single Crystals of Tellurium. J. J. Loferski. *Physical Review,* ser. B, v. 87, Sept. 1, 1952, p. 905-906.

Transmission of Te crystals was observed in the infrared, and measured as a function of polarization of incident radiation relative to the C-axis of the crystal. Graphs present results. (P17, Te)

523-P. Neutron Total Cross Section for Lead Between 37 and 156 Mev. A. E. Taylor and E. Wood. *Physical Review,* ser. B, v. 87, Sept. 1, 1952, p. 907-908.

Method and results. (P10, Pb)

524-P. Size Effects in the Superconductivity of Cadmium. M. C. Steele and R. A. Hein. *Physical Review,* ser. B, v. 87, Sept. 1, 1952, p. 908.

Electrical and magnetic properties of matter below 1° K. Cd pellets were used. (P15, P16, Cd)

525-P. (French.) **Contribution to the Study of the Conductivity of Silicon.** Marcel Perrot and Jean Tortosa. *Comptes Rendus hebdomadaires des Seances de l'academie des Sciences,* v. 235, July 16, 1952, p. 143-145.

Conductivity of thin strips of Si prepared by thermal evaporation of a 98.75% Si thin film onto glass. Results are charted. (P15, Si)

526-P. (French.) **Semiconductive Properties of Tellurium.** Pierre Aigrain, Claude Dugas, Jacques Legrand des Cloizbeaux, and Bernard Jancovici. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 235, July 16, 1952, p. 145-146.

Properties and structure of a semiconducting Te monocrystal were studied by means of electric conductivity and Hall-effect measurements at various temperatures between that of liquid nitrogen and 50° C. (P15, Te)

527-P. (Book.) **Industrial Magnetic Testing.** N. S. Asprey. 132 pages. Mar. 1952. Institute of Physics, 47 Belgrave Square, London. S.W. 1, England. 25s.

Although this book contains a chapter entitled "Permanent Magnet Testing," it is not concerned with the design and use of thickness testers but rather with considerations involved in measurement of magnetic field strength. The whole book is theoretical rather than practical; designed for users who want to know how best to measure the performance of magnetic materials and to judge their suitability for particular applica-

tions. (From review in *Electroplating and Metal Finishing.)*
(P16, S13, S14)

528-P. (Book.) **Molybdenum Compounds; Their Chemistry and Technology.** D. H. Killeffer and Arthur Linz. 407 pages. 1952. Interscience Publishers, Inc., 250 Fifth Ave., New York 1, N. Y.

Includes a chapter on structural chemistry of Mo, by Linus Pauling. Third chapter is devoted to physical, chemical, and mechanical properties of Mo itself. The chapter on Mo catalysts occupies about half of the book by virtue of its extensive indexed catalyst bibliography.
(P general, Q general, Mo)

529-P. (Book.) **The Oxidation States of the Elements and Their Potentials in Aqueous Solutions.** Ed. 2. Wendell M. Latimer. 392 pages. 1952. Prentice-Hall, Inc., 70 Fifth Ave., New York 11, N. Y.

Summary of existing data. Present edition includes more extensive thermodynamic data of special significance in interpretation of inorganic chemistry; potential diagrams for all elements which have more than one oxidation state; several hundred new values; and amplified treatment of U, Np, Pu, Am, and the actinide elements. Footnote references, extensive tables, and study questions. (P12, P13)

530-P. Heat Conductivity of Superconductive Lead Below 1° K. J. L. Olsen and C. A. Renton. *Philosophical Magazine,* ser. 7, v. 43, Sept. 1952, p. 946-948.

Graphical data are presented.
(P11, Pb)

531-P. Interpretation of the de Haas-van Alphen Effect. L. Onsager. *Philosophical Magazine,* ser. 7, v. 43, Sept. 1952, p. 1006-1008.

Deals with magnetic susceptibilities of metals. (P16)

532-P. Magnetic Viscosity Under Discontinuously and Continuously Variable Field Conditions. R. Street, J. C. Woolley, and P. B. Smith. *Proceedings of the Physical Society,* v. 65, sec. B, Sept. 1, 1952, p. 679-696.

Apparatus, specimens of Fe, discontinuous field changes, continuously variable demagnetizing fields, and relation between magnetic viscosity and irreversible susceptibility. Diagrams and graphs.
(P16, Fe, SG-n, p)

533-P. Pile Neutron Absorption Cross Sections of Lead 206 and 207. K. L. Aitken, D. J. Littler, E. E. Lockett, and G. H. Palmer. *Proceedings of Physical Society,* v. 65, sec. A, Sept. 1, 1952, p. 761.

Mass spectrometer analyses and cross-section measurements of two samples of Pb. (P10, Pb)

534-P. The Deuteron Stripping Reaction With Aluminium. J. R. Holt and T. N. Marsham. *Proceedings of Physical Society,* v. 65, sec. A, Sept. 1, 1952, p. 763-764.

Reports results obtained with the reaction $^{27}Al(d, p)\ ^{28}Al$. Graphs.
(P10, Al)

535-P. The Thermal Accommodation Coefficient of Gases and Their Adsorption on Iron. A. E. J. Eggleton and F. C. Tompkins. *Transactions of the Faraday Society,* v. 48, Aug. 1952, p. 738-749.

Part of a general study of kinetics and thermodynamics of sorption of gases by pure Fe in which thermal accommodation coefficients of several gases at an Fe wire have been measured. Graphs and tables. 24 ref. (P13, Fe)

536-P. (English.) **An Investigation of the Validity of the Wiedemann-Franz-Lorenz Law.** J. O. Linde. *Arkiv För Fysik,* v. 4, no. 6, 1952, p. 541-554.

A critical investigation of the thermal conductivity of normal metals (Cu, Au, and Al) and Ag alloys. A formula is presented for the relation between thermal and electrical resistivity which takes into account the different behavior of the two parts of thermal resistivity of an alloy as regards their temperature dependence. Results are analyzed by above law. Graphs. 10 ref.
(P11, Cu, Au, Ag, Al)

537-P. (German.) **Theory on the Saturation Magnetism in Binary Ferromagnetic Alloys.** Hermann Statz. *Zeitschrift für Naturforschung,* v. 7a, Aug. 1952, p. 506-511.

Study of the electron structure of certain binary alloys and correlation with the saturation magnetization. Diagrams and graphs.
(P16, SG-n, p)

538-P. Dimensional Changes Normal to the Direction of Diffusion. R. W. Balluffi and B. H. Alexander. *Journal of Applied Physics,* v. 23, Sept. 1952, p. 953-956.

Measurements of dimensional changes normal and parallel to direction of diffusion in small wires and thin foils of Au into which Ag was diffused from the vapor. Diagram, tables, graph, and photomicrographs. 12 ref. (P10, N1, Au, Ag)

539-P. The Temperature Dependence of the Viscosity of Liquids. F. Gutmann and L. M. Simmons. *Journal of Applied Physics,* v. 23, Sept. 1952, p. 977-978.

Equation derived and its adequacy examined for literature data on a variety of liquids, organic and in-

organic, and the metals, Hg, Ga, K, and Na. 10 ref. (P10, Hg, Ga)

540-P. Field Emission From Tantalum in the Normal and Superconducting State. Robert Gomer and John K. Hulm. *Journal of Chemical Physics,* v. 20, Sept. 1952, p. 1500-1502.

Experimental procedure and results. Photograph of microscope assembly used. (P15, Ta)

541-P. The Free Energies of Formation of Tricalcium and Tetracalcium Phosphates. J. B. Bookey. *Journal of the Iron and Steel Institute,* v. 172, Sept. 1952, p. 61-66.

To increase knowledge of P-O equilibria the reduction equilibria of tricalcium and tetracalcium phosphates with hydrogen were studied in the range 1250-1550° C., and results used to calculate free-energy changes involved in reactions of solid CaO and gaseous oxygen and phosphorus and in that of the solution of gaseous phosphorus in liquid iron. Apparatus diagram and tables. 14 ref. (P12, Fe)

542-P. The Free Energy of Formation of Magnesium Phosphate. J. B. Bookey. *Journal of the Iron and Steel Institute,* v. 172, Sept. 1952, p. 66-68.

A study in relation to complex dephosphorizing slags. Reduction equilibrium of Mg orthosphosphate with H was studied in range 1000-1250° C., and results used to calculate above. 12 ref. (P12, B21)

543-P. Thermodynamic Properties of Silicon Monoxide; an Experimental Study of the Equilibria $SiO_2 + Si = 2SiO$ and $SiO_2 + H_2 = SiO + H_2O$. N. C. Tombs, A. J. E. Welch. *Journal of the Iron and Steel Institute,* v. 172, Sept. 1952, p. 69-78.

A study of the above in the range 1200-1650° C. Significance to steelmaking. Tables. 25 ref. (P12, B21)

544-P. Infrared Absorption in High Purity Germanium. H. B. Briggs. *Journal of the Optical Society of America,* v. 42, Sept. 1952, p. 686-687.

Results of measurements of extinction coefficients for high purity single-crystal Ge in region of fundamental absorption limit which may be used to predict performance near cut-off range of optical filters of various thicknesses. Typical transmission curves for range 2-25μ are included. Graphs. (P17, Ge)

545-P. Silver Films and Dielectric Multiple Films in Interferometry. D. A. Jackson and K. Kuhn. *Nature,* v. 170, Sept. 13, 1952, p. 455-456; disc., p. 456.

Brief critical report on work done by A. H. Jarrett and H. v. Klüber, followed by a short discussion by A. H. Jarrett in which he mentions some of his recent experimental results. (P17, T8, Ag)

546-P. Russell Effect on Evaporated Metal Films. L. Grunberg and K. H. R. Wright. *Nature,* v. 170, Sept. 13, 1952, p. 456-457.

Experimental data. Effect is that freshly abraded metal surfaces produce an image on photographic plates. (P17)

547-P. Effect of Minority Carriers on the Breakdown of Point Contact Rectifiers. Ernst Billig. *Physical Review,* ser. 2, v. 87, Sept. 15, 1952, p. 1060-1061.

On the application of short high-voltage pulses to point contact rectifiers in the inverse direction, thermal instability of Ge and Se is observed. Intrinsic conduction due to the thermal generation of electron-hole pairs and the subsequent passage of minority carriers is suggested as the cause of electrical breakdown. 10 ref. (P15, Ge, Se)

548-P. The Resistivity of Cu_3Au During Neutron Irradiation. H. L. Glick, F. C. Brooks, W. F. Witzig, and W. E. Johnson. *Physical Review,* ser. 2, v. 87, Sept. 15, 1952, p. 1074.

Samples of initially ordered and disordered Cu_3Au were irradiated in a nuclear reactor at 80° C. Continuous electrical resistivity measurements suggested that pile irradiation has both ordering and disordering tendencies. (P15, Cu, Au)

549-P. Mobility of Electrons in Germanium. P. P. Debye and E. M. Conwell. *Physical Review,* ser. 2, v. 87, Sept. 15, 1952, p. 1131-1132.

Measurements were made, at room temperature, on a number of Ge samples in various conductivity ranges which yielded higher mobilities than any previously found. In range of resistivity for which drift mobility values are available, new values substantially agree with drift mobility values measured by Haynes. (P15, Ge)

550-P. Superconductivity Below 1° K. M. C. Steele. *Physical Review,* ser. 2, v. 87, Sept. 15, 1952, p. 1137-1138.

Experiments for studying critical magnetic curves for Ru and Cd. Graphs. (P16, Ru, Cd)

551-P. Interpretation of the Low Temperature Hall Curve of a Degenerate Germanium Sample. D. M. Finlayson, V. A. Johnson, and F. M. Shipley. *Physical Review,* ser. 2, v. 87, Sept. 15, 1952, p. 1141-1142.

Graphs and table. (P15, Ge)

552-P. Theoretical and Experimental Heat Capacities of Superconducting Metals. R. W. Worley, W. M. Zemansky, and H. A. Boorse. *Physical Re-*

view, ser. 2, v. 87, Sept. 15, 1952, p. 1142-1143.

Results of their experiments compared with those of previous investigations. Metals studied were V, Cb, Ta, La, In, and Sn. Graphs. 11 ref. (P15, V, Cb, Ta, La, In, Sn)

553-P. Nitrogen in Metals. David O. Caldwell. *Review of Scientific Instruments*, v. 23, Sept. 1952, p. 501-502.

Nitrogen activities in several metals were investigated using the UCLA 41-in. synchrocyclotron. Graph. (P12)

554-P. The Mechanism of Hydrogen Evolution at Copper Cathodes in Aqueous Solutions. J. O'M. Bockris and N. Pentland. *Transactions of the Faraday Society*, v. 48, Sept. 1952, p. 833-839.

Application to Cu cathodes on which no work in purified solutions is recorded. Tables and graphs. 23 ref. (P15, Cu)

555-P. Copperweld Fine Wire. F. E. Leib. *Wire and Wire Products*, v. 27, Sept. 1952, p. 878-880, 927.

Physical and mechanical properties and applications as a fine wire conductor.
(P general, Q general, T1, ST, Cu)

556-P. (English.) **The Influence of Elastic Shear Strains on the Conductivity and Thermo-Electric Force of Cubic Metals.** J. Smit. *Physica*, v. 18, Aug.-Sept., 1952, p. 587-596.

Influence which elastic shear strains have on shape of Fermi surface of metals and on electrical conductivity. Thermal e.m.f. was calculated for monovalent f.c.c. metals, and results were compared with experimental values for Cu, Ag, and Au. 12 ref. (P15, Q21, Cu, Ag, Au)

557-P. (English.) **On the Behaviour of an Electrically Conductive Liquid in a Magnetic Field.** Bo Lehnert. *Arkiv för Fysik*, v. 5, no. 1-2, 1952, p. 69-90.

Theoretical discussion, and experimental data for mercury.
(P15, P16, Hg)

558-P. (English.) **Experimental Researches on "Wetting Effect" and "Liquostriction".** Carl Benedicks and Robert Härden. *Arkiv för Fysik*, v. 3, nos. 4-5, 1952, p. 407-440.

Considers new experiments regarding wetting effect on various substances together with theoretical points of view regarding the concept of surface tension. Also gives experimental data on effect of liquostriction — the expansion effect caused by intimate contact of a liquid with a solid body. Includes sections relating to both metals and nonmetals. (P10)

559-P. (English.) **Determination of the Alpha-Energy of U^{235}.** R. Vestergaard and E. Haeffner. *Arkiv för Fysik*, v. 3, no. 6, 1952, p. 557-575.

Experimental details and data. Circuit diagrams and graphs. 21 ref. (P10, U)

560-P. The Viscosity of Molten Tin, Lead, Zinc, Aluminium, and Some of Their Alloys. T. P. Yao and V. Kondic. *Journal of the Institute of Metals*, v. 81, Sept. 1952, p. 17-24.

Previous work as well as experimental research by the author. The apparatus employed was such that both the rotating-crucible and oscillating-pendulum methods could be employed. Oscillograms, tables, and schematic diagram of the viscometer. 11 ref. (P10, Sn, Pb, Zn, Al)

561-P. Magnetic Susceptibilities of Palladium-Rhodium Alloys From 20°-300° K. F. E. Hoare, J. S. Kouvelites, and J. C. Matthews. *Nature*, v. 170, Sept. 27, 1952, p. 537-538.

Possibilities of increasing the number of holes in the *d*-band by alloying small amounts of an appropriate metal (rhodium or silver) with palladium. (P16, Pd)

562-P. A New Gyromagnetic Effect in Permalloy and Iron. S. J. Barnett and Louis A. Giambomi. *Physical Review*, ser. 2, v. 88, Oct. 1, 1952, p. 28-37.

Reviews previous work and theory involved. Describes experiments. Diagrams and graphs. 10 ref.
(P16, Ni, Fe)

563-P. Radiation Damage and Recovery in Cu, Ag, Au, Ni, and Ta. J. W. Marx, H. G. Cooper, and J. W. Henderson. *Physical Review*, ser. 2, v. 88, Oct. 1, 1952, p. 106-112.

Electrical resistivity changes induced by 12-Mev. deuteron bombardment of Cu, Ag, Au, Ni, and Ta foils were determined as functions of integrated flux. Bombardments were carried out at about −140 and −150° C., and differences in the two sets of measurements were traced to a thermal recovery process. It is suggested that migration of vacancy pairs offers a reasonable model for initial recovery process, although other mechanisms are also discussed. Diagrams, tables, and graphs. 16 ref.
(P13, Cu, Au, Ag, Ni, Ta)

564-P. A New Photographic Method of Measuring the Dispersion of the Optical Constants of Metals. J. Bor. *Proceedings of the Physical Society*, v. 65, sec. B, Oct. 1, 1952, p. 753-758.

Dispersion is determined on a photographic plate as a vertical band of variable intensity for each wavelength and is compared microphotometrically with an adjacent band of graded intensity produced by same wavelength. Diagrams. (P17)

565-P. The Absorption of Light By Noble Metals and Its Relation to the van der Waals Contribution to the Cohesive Energy. J. Friedel. *Proceedings of the Physical Society,* v. 65, sec. B, Oct. 1, 1952, p. 769-774.

Theoretical analysis. Diagrams and tables. 20 ref. (P17, EG-c)

566-P. The Optical Constants of Thin Metallic Films Deposited by Evaporation. P. L. Clegg. *Proceedings of the Physical Society,* v. 65, sec. B, Oct. 1, 1952, p. 774-781.

Optical properties of evaporated films of Ag, Au, Sn, and In were determined by a photo-electric method. Influence of factors concerned with evaporation procedure was investigated in case of Ag films. Application of Maxwell Garnett's theory shows qualitative agreement with experimental values. Graphs. 10 ref. (P17, L25, Ag, Au, Sn, In)

567-P. Universal Skin-Effect Chart for Conducting Materials. Harold A. Wheeler. *Electronics,* v. 25, Nov. 1952, p. 152-154.

Skin depth, napier depth, and depth of penetration of current in various nonmagnetic and nonferrous metals, solutions, and ground at frequencies ranging from 1 cps. to 1,000,000 mc. Graph and tables. 16 ref. (P15, EG-a)

568-P. The Heat Capacity of Gallium From 15 to 320° K. The Heat of Fusion at the Melting Point. George B. Adams, Jr., Herrick L. Johnson, and Eugene C. Kerr. *Journal of the American Chemical Society,* v. 74, Oct. 5, 1952, p. 4784-4787.

Measurements were made on five samples of Ga over above range. A table of thermodynamic functions was prepared for Ga at smoothed values of temperatures. Tables. 14 ref. (P12, Ga)

569-P. The Vapor Pressure of Germanium. Alan W. Searcy. *Journal of the American Chemical Society,* v. 74, Oct. 5, 1952, p. 4789-4791.

Determined over the 1510-1882° K. range by the Kundsen effusion method. Tables. 19 ref. (P12, Ge)

570-P. Contact Resistance. Wm. B. Kouwenhoven and Clarence W. Little. *Welding Journal,* v. 31, Oct. 1952, p. 457s-465s.

Laws that apply to resistance offered by electric contacts used in resistance welding and in electric circuits. Metals used in investigation were Al, brass, bronze, Ag, and stainless. Photomicrographs, diagrams, and graphs.
(P15, K3, Al, Cu, Ag, SS)

571-P. Selection and Processing of Chromium-Nickel Stainless Steels for Magnetic Applications. F. K. Bloom and J. S. White. *Wire and Wire Products,* v. 27, Oct. 1952, p. 1036-1038, 1126-1127.

Effect of chemical composition and processing on magnetic properties of Cr alloy and Cr-Ni alloy steels. Processing refers largely to the wiredrawing operation.
(P16, F28, SS)

572-P. (French.) **The Ferromagnetism of Certain Gadolinium-Magnesium Alloys.** Francoise Gaume-Mahn. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 235, Aug. 4, 1952, p. 352-354.

Results on alloys which the amount of Gd exceeds 68%. Graph. (P16, Gd, Mg)

573-P. (French.) **The Magnetic Behavior of Rhenium Associated With Palladium.** Jules Wucher and Nicholas Perakis. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 235, Aug. 11, 1952, p. 419-421.

Experimental results of a thermomagnetic study of the Re-Pd system. (P16, Re, Pd)

574-P. (French.) **Thermo-Electric Measurements on Silicon P.** Jean Savornin and France Savornin. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 235, Aug. 18, 1952, p. 465-468.

Emf. of thermocouples consisting of a Si bar plus a Cu wire was measured. The Si used is positive in relation to the Cu; the thermoelectric power in relation to the Cu is 700 MV. per degree, for 99.85% purity. (P15, Cu, Si)

575-P. (French.) **Thermal Conductivity. Its Importance to the Behavior of Heat-Resistant Materials.** M. Pommellet. *Métaux: Corrosion—Industries,* v. 27, July-Aug. 1952, p. 318-324.

Possibilities of theoretical calculation, and of practical utilization of the method in nonisotropic media. (P11, SG-h)

576-P. (French.) **Influence of Sulfur on the Properties of Cementite.** J. Drain and A. Michel. *Revue de Métallurgie,* v. 49, Aug. 1952, p. 585-588; disc., p. 589.

Experimental arrangement for the investigation. The influence of sulfur on Curie point, stability, and rate of the austenitic-ferritic transformation. Diagrams. 11 ref.
(P16, N8, ST)

577-P. (German.) **Semiconducting Properties of Intermetallic Compounds (CdSb).** Eduard Justi and Günter Lautz. *Abhandlungen der Braunschweigischen Wissenschaftlichen Gesellschaft,* v. 4, 1952, p. 107-116.

Tabulated data, charts, and references. (P15, Cd, Sb)

578-P. (German.) **Research on the Occurrence of Separate Processes in Magnetostriction.** Eduard Bailitis, Curt Hagen, and Hans Heinrich Rust. *Zeitschrift für Angewandte Physik,* v. 4, Aug. 1952, p. 284-291.

Reversible and irreversible processes in magnetostriction. Magnetostriction is composed of different distinct processes. Investigation reveals three processes which vary with remanence and coercive force of the material. Data for several magnetic metals and alloys. 11 ref. (P16, SG-n)

579-P. (German.) **Mechanism of Resistance Change in a Magnetic Field.** A. Nedoluha and K. M. Koch. *Zeitschrift für Physik,* v. 132, Aug. 1952, p. 608-620.

A new diagram for conductors of complex conduction mechanism, especially alloys, is shown to explain the above more clearly than customary models of the electron theory. Diagrams. 10 ref. (P15)

580-P. (Russian.) **The Specific Catalytic Activity of Metallic Platinum.** V. S. Chesalova and G. K. Boreskov. *Doklady Akademii Nauk SSSR,* new ser., v. 85, July 11, 1952, p. 377-379.

A study was made of the specific activity of Pt prepared by different methods and having different specific surfaces. (P13, Pt)

581-P. Thermodynamic Properties of the Liquid Ternary System Bismuth-Cadmium-Tin. Svante Mellgren. *Journal of the American Chemical Society,* v. 74, Oct., 20, 1952, p. 5037-5040.

Activity of cadmium in liquid Bi-Cd-Sn alloys was determined with aid of e.m.f. measurements. From these values, integral molar excess free energy and partial molar excess free energies of all components were calculated. Tables and graphs. (P12, Bi, Cd, Sn)

582-P. Principles Involved in the Formation of Iron Alloys. K. W. Andrews. *Metal Treatment and Drop Forging,* v. 19, Oct. 1952, p. 425-432.

Develops a number of empirical relationships. Includes study of experimental facts to deduce principles of classification, semiquantitative study of diagrams from a thermodynamic viewpoint, and explanation of formation of alloys and their constitution and properties in terms of modern electronic theory of atomic structure. Graphs and diagrams. 24 ref. (P12, M25, Fe)

583-P. Superconductivity of Rhenium. J. G. Daunt and T. S. Smith. *Physical Review,* ser. 2, v. 88, Oct. 15, 1952, p. 309-311.

Report on measurements made in the liquid helium temperature region of the magnetic threshold curve of Re by observations of magnetic moment of powdered samples. Graphs and tables. 14 ref. (P15, P16, Re)

584-P. The Superconductive Transition in Tantalum. H. Preston-Thomas. *Physical Review,* ser. 2, v. 88, Oct. 15, 1952, p. 325-327.

Use of small coreless coils allows simultaneous measurement of resistive and magnetic transitions in Ta. Results are explained on basis of a modification of a two-phase model and critical field-temperature curves are derived for bulk metal and for filament material. Graphs. (P15, P16, Ta)

585-P. Mean Free Paths of Electrons in Evaporated Metal Films. F. W. Reynolds and G. R. Stilwell. *Physical Review,* ser. 2, v. 88, Oct. 15, 1952, p. 418-419.

Determination using thin films of Cu and Ag. Compares measured and calculated resistance - temperature coefficients. (P15, M25, Cu, Ag)

586-P. Sensitive Recording Alternating-Current Hall Effect Apparatus. E. M. Pell and R. L. Sproull. *Review of Scientific Instruments,* v. 23, Oct. 1952, p. 548-552.

Apparatus which will measure mobilities of the order of 10^{-2} sq. cc. per volt-sec. in semiconductors, and is especially suited for measuring Hall voltage in samples of very low conductivity. (P15)

587-P. Some Studies on the Behaviour of Metals and Alloys at Elevated Temperatures Under Vacuum. W. Baukloh and G. P. Chatterjee. *Transactions of the Indian Institute of Metals,* v. 4, 1950, p. 239-252; disc., p. 252-254.

Behavior of α-β brass when heated in vacuum at different temperatures for different periods of time. It was found that, when a piece of polished unetched brass is heated under vacuum, Zn volatilizes from grain boundaries at a faster rate than from the grains, resulting in vacuum etching which occurs at different temperatures depending on time and amount of cold reduction. Loss of weight due to volatilization was found to be a function of temperature, time, surface area, and amount of cold rdeuction. (P12, Cu)

588-P. (German.) **Standard Resistors of Gold-Chromium Alloy.** A. Schulze and H. Eicke. *Zeitschrift für Angewandte Physik,* v. 4, Sept. 1952, p. 321-324.

Demand for greater accuracy in electrical measuring led to development of Au-Cr alloys to replace

manganin. Different designs of Au-Cr alloy resistors. Data are tabulated. (P15, T1, Au)

589-P. (German.) **Perturbance Conductivity and Semiconductivity of Intermetallic Compounds. II.** E. Justi and G. Lautz. *Zeitschrift für Naturforschung,* v. 7a, Sept. 1952, p. 602-613.

Effect of temperature on electrical conductivity resistance change in a magnetic field, differential thermoelectric force, and rectifying properties of CdSb. Results show that stoichiometric CdSb is an intrinsic semiconductor. Graphs, diagrams, and tables. 17 ref. (P15, Cd, Sb)

590-P. The Heat of Combustion of Neodymium. Elmer J. Huber, Jr., and Charles E. Holley, Jr. *Journal of the American Chemical Society,* v. 74, Nov. 5, 1952, p. 5530-5531.

Investigation of the heats of formation of rare-earth oxides from which the metals can be obtained, specifically work on Nd. (P12, Nd, EG-g)

591-P. Solid State Physics in Electronics and in Metallurgy. W. Shockley. *Journal of Metals,* v. 4, Aug. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 829-842.

Urges that metallurgical industry support fundamental research on dislocations in their own laboratories and in universities. Experience of the author is drawn largely from two fields in solid-state physics —transistor electronics and dislocation theory, and their relationship. Some new results exhibit features of dislocations with a clarity comparable to that achieved for holes and excess electrons in semiconductors. Experimental examples are concerned with growth spirals, grain-boundary energies, strength of small metal crystals, and surface hardening of Al crystals. Numerous diagrams and illustrations. 28 ref. (P12, P15, M26)

592-P. Thermal Buckling of Plates. Myron L. Gossard, Paul Seide and William M. Roberts. *National Advisory Committee for Aeronautics,* Technical Note 2771, Aug. 1952, 39 pages.

Approximate method, based on large-deflection plate theory, for calculating deflections of flat or initially imperfect plates subject to thermal buckling. This method was used to determine deflections of a simply supported 75S-T6 Al-alloy panel subjected to a tentlike temperature distribution over the plate surface. Schematic diagrams and tables. (P11, Al)

593-P. Photon Absorption Cross Sections in Bismuth and Tantalum. J. Halpern, R. Nathans, and A. K. Mann. *Physical Review,* ser. 2, v. 88, Nov. 1, 1952, p. 679-680.

Measured by a method of delayed neutron detection. 11 ref. (P10, Bi, Ta)

594-P. Properties of Silicon and Germanium. Esther M. Conwell. *Proceedings of the I.R.E.,* v. 40, Nov. 1952, p. 1327-1337.

Latest experimental information on those fundametal properties of Ge and Si which are of device interest, currently or potentially. Electrical properties, especially carrier density and mobility; detail; physical background. Tables and graphs. 50 ref. (P15, Si, Ge)

595-P. The Temperature Variations of the Magnetization of Nickel in Low and Moderate Fields. R. S. Tebble, J. E. Wood, and J. J. Florentin. *Proceedings of the Physical Society,* v. 65, sec. B, Nov. 1, 1952, p. 858-871.

Results of measurements of reversible changes in magnetization accompanying changes in temperature in annealed Ni. Results in relation to work of Bates and others on temperature changes produced by adiabatic changes in magnetization (the magnetocaloric effect). Graphs. 13 ref. (P17, Ni)

596-P. Antiferromagnetism and Ferrimagnetism. Louis Neel. *Proceedings of the Physical Society,* v. 65, sec. A, Nov. 1, 1952, p. 869-885.

Present knowledge of antiferromagnetism, including ferrimagnetism. Some phenomena concerning magnetic behavior of certain ferrites and of pyrrhotite. Graphs and diagrams. 32 ref. (P17, SG-n, p)

597-P. The Effect of Temperature of Deformation on the Electrical Resistivity of Cold-Worked Metals and Alloys. T. Broom. *Proceedings of the Physical Society,* v. 65, sec. B, Nov. 1, 1952, p. 871-881.

Apparatus used to draw wires of Al, Cu, Ni, Fe, 50-50 Ag-Au, 75-25 brass, and Ag_3Mg at temperatures between −183 and 100° C., and to measure their resistances at the temperature of drawing. Results suggest that a unified theory of effect of deformation on resistivity of both pure metals and alloys can be based on stacking faults. Graphs and tables. 22 ref. (P15, Al, Cu, Ni, Fe, Ag, Au, Mg)

598-P. Spin Degeneracy and the Theory of Collective Electron Ferromagnetism. A. B. Lidiard. *Proceedings of the Physical Society,* v. 65, sec. A, Nov. 1, 1952, p. 885-893.

Theoretical analysis with application to Fe, Co, and Ni. 15 ref. (P17, Fe, Co, Ni)

599-P. A Critical Study of the Asymmetrical Temperature Gradient Thermoelectric Effect in Copper and Platinum. N. Fuschillo. *Proceedings of the Physical Society,* v. 65, sec. B, Nov. 1, 1952, p. 896-904.

Proves a rigorous test of existence of above by correlating effects produced by symmetrical gradients with those produced by gradients of pronounced asymmetry at both high and low temperatures and at many points along considerable lengths of wire. Attention was paid to elimination of strain, impurity, and hidden sources of error. Means of reducing inhomogeneity effects in Cu wires. Graphs. 12 ref. (P15, Cu, Pt)

600-P. Resistance of Germanium Contacts. J. B. Gunn. *Proceedings of the Physical Society,* v. 65, sec. B, Nov. 1, 1952, p. 908-909.

Brief theoretical analysis. (P15, Ge)

601-P. Ferromagnetism. Ursula M. Martins. "Progress in Metal Physics. Vol. 3" (Interscience Publishers, New York), 1952, p. 140-175.

Effect of location in periodic table, saturation magnetization, energy relationship in ferromagnetic crystals, domain configurations, theories of coercive force, polycrystalline materials, and ferromagnetic permeability. Diagrams, graphs, and micrographs. 64 ref. (P17, SG-n, p)

602-P. Properties of Metals at Low Temperatures. K. C. MacDonald. "Progress in Metal Physics. Vol. 3" (Interscience Publishers, New York), 1952, p. 42-75.

Summarizes recent progress in observation of fundamental electrical and thermal properties, primarily in low-temperature region. Specific heats and electrical conductivity in particular. Graphs and tables. 137 ref. (P11, P12, P15)

603-P. (Book.) **Mixtures. The Theory of the Equilibrium Properties of Some Simple Classes of Mixtures, Solutions, and Alloys.** E. A. Guggenheim. 270 pages. 1952. Oxford University Press, Amen House, Warwick Sq., London E.C. 4, England.

Applies statistical thermodynamics to certain models of solid, liquid, and gaseous mixtures. Includes chapters on classical and statistical thermodynamics of mixtures; ideal, regular, and dilute solutions; lattice imperfections; superlattices; athermal and non-athermal mixtures; and macromolecular solutions. (P12, M26)

604-P. (Book.) **Progress in Metal Physics. Vol. 3.** Bruce Chalmers, editor. 334 pages. 1952. Interscience Publishers, 250 Fifth Ave., New York 1. $8.00.

Reviews of present state of knowledge in specialized aspects of physical metallurgy and metal physics, by various authors. Each of the eight articles is separately abstrated. (P general, N general)

SECTION Q

MECHANICAL PROPERTIES and TEST METHODS; DEFORMATION

1-Q. Recent Contributions to the Theory of Plasticity. William Prager. *Applied Mechanics Reviews,* v. 4, Nov. 1951, p. 585-588.

A review. Numerous references. (Q23)

2-Q. The Form of an Aluminium Alloy Angle for Use as a Strut. C. G. Watson. *Engineer,* v. 192, Oct. 19, 1951, p. 482-485.

Design of an Al-alloy angle section giving greatest economy of material when used as a strut. The alloy used is Noral 51S-T. Its stress-strain relationship is shown graphically. From this is derived a graph in which stress is related to tangential modulus of elasticity; and from this, the Euler curve is constructed. (Q23, Al)

3-Q. Brittle Fracture of Mild Steel. T. S. Robertson. *Engineering,* v. 172, Oct. 5, 1951, p. 445-448.

Previously abstracted from *Engineer.* See item 608-Q, 1951. (Q23, ST)

4-Q. ML Aluminium Alloy; A Material for Elevated Temperatures. J. C. McGee. *Foundry,* v. 79, Dec. 1951, p. 112-113, 195.

See abstract of "ML Aluminum Casting Alloy—A Material for Elevated Temperatures," *CADO Technical Data Digest,* item 453-Q, 1951. (Q general, Al, SG-h)

5-Q. Factors Affecting the Quality of Cast Steel. T. N. Armstrong. *Foundry,* v. 79, Dec. 1951, p. 114-117, 207-208.

Effect of additions on mechanical properties is stressed. Micrographs and graphed and tabulated data. (Q general, E25, CI)

6-Q. Arc-Cast and Powdered Molybdenum Tested. J. H. Bechtold and Howard Scott. *Iron Age,* v. 168, Nov. 22, 1951, p. 92-95.

Unalloyed Mo has good ductility but becomes brittle at temperatures not much below freezing. Tensile and creep strengths at high temperature are low. Predicts that while further research should lead to useful alloys, molybdenum-base gas-turbine blades are unlikely. 11 ref. (Q23, T25, Mo)

7-Q. Measurement of the Distribution of Tensile and Bond Stresses Along Reinforcing Bars. R. M. Mains. *Journal of the American Concrete Institute,* v. 23, Nov. 1951; *ACI Proceedings,* v. 48, 1951, p. 225-252.

Tensile and bond stresses were measured along reinforcing bars by a new technique which does not disturb bond stresses. Curves for representative beam and pull-out specimens show tensile-force distribution, bond-stress distribution, applied moment vs. measured bar tension, comparison of beam and pull-out tensile-force distribution, and applied load vs. slip of the bar. Comparison of ordinarily calculated bond with measured local maximum values shows the calculated values to be frequently less than one-half the values measured in these tests. Evidence shows that cracks in beams decisively affect magnitude and distribution of tensile and bond stresses. (Q25, Q27, CN)

8-Q. Recent Progress in the Plastic Methods of Structural Analysis. P. S. Symonds and B. G. Neal. *Journal of the Franklin Institute,* v. 252, Nov. 1951, p. 383-407.

Recent developments in methods of plastic failure analysis based on certain simple hypotheses as to the carrying capacity of flexural members. The basic hypotheses are first defined and a simple example is given to illustrate their use. Certain physical assumptions are made concerning the carrying capacity of flexural members of mild steel. 19 ref. (Q25, ST)

9-Q. Slip Bands and Hardening Processes in Aluminium. A. F. Brown. *Journal of the Institute of Metals,* v. 80, Nov. 1951, p. 115-124.

Slip bands in Al increase in num-

ber during plastic deformation and, at the same time, further slip occurs within each band. At higher temperatures and lower rates of deformation, as well as with increasing strain under all conditions, the latter process becomes increasingly predominant. This is interpreted on the basis of the fine structure of slip bands resolved by the electron microscope. Differences in density and inner structure of slip bands formed under different conditions are compared with differences between stress-strain curves. (Q24, Al)

10-Q. The Creep and Softening Properties of Copper for Alternator Rotor Windings. N. D. Benson, J. McKeown, and D. N. Mends. *Journal of the Institute of Metals*, v. 80, Nov. 1951, p. 131-142.

Resistance to creep of a number of high-conductivity coppers was investigated in the range 130-225° C. Softening characteristics were also determined over the same temperature range. Creep resistance and resistance to softening were shown to be very much greater for Ag-bearing (0.1% Ag) than for Ag-free, tough-pitch Cu. Creep resistance and resistance to softening of OFHC Cu are greater than those of tough-pitch coppers when both are Ag-free. Ag-bearing (0.1%) OFHC and tough-pitch coppers have similar resistances to creep and softening. 12 ref. (Q3, Cu)

11-Q. An Investigation of the Structural Changes Accompanying Creep in a Tin-Antimony Alloy. W. Betteridge and A. W. Franklin. *Journal of the Institute of Metals*, v. 80, Nov. 1951, p. 147-150.

A Sn + 5% Sb alloy was used for a microscopical study of phenomena occurring during creep at room temperature. In addition to general slip within the grains and flow at the grain boundaries, it is shown that localized strain within the grains occurs in directions associated with boundaries between adjacent grains. It is also suggested from this work, and from an examination of a pure Al sample strained in creep at 250° C., that the "cell structure" observed by X-ray examination is a result of the break-up of the grains by slip bands and by local strains. 10 ref. (Q3, Sn, Al)

12-Q. Discussion of the Paper—"The Effect of Cold-Work on Steel," J. H. Andrew, H. Lee, and others. *Journal of the Iron and Steel Institute*, v. 169, Oct. 1951, p. 133-136.

Paper published in v. 165, June 1950, and Aug. 1950. See item 460-Q, 1950. (Q23, P15, ST)

13-Q. Tensile and Impact Properties of Iron and Some Iron Alloys of High Purity. W. P. Rees, B. E. Hopkins, and H. R. Tipler. *Journal of the Iron and Steel Institute*, v. 169, Oct. 1951, p. 157-168.

Tensile and impact properties of high-purity Fe and Fe-Mn, Fe-C, and Fe-C-Mn alloys, at various temperatures covering the tough to brittle transition. Technique used to carry out tests at low temperatures. Two types of brittleness, intergranular and cleavage, can occur in iron. Evidence indicates that oxygen is effective in promoting intergranular brittleness. It is also affected either by grain size or by some other factor resulting from the treatment used to obtain coarse grains. (Q23, Q27, Q6, Fe)

14-Q. Canadian Progress in Magnesium Extrusion Alloys. H. G. Warrington. *Modern Metals*, v. 7, Nov. 1951, p. 23-27.

By using high-purity metal made by the ferrosilicon process, the Canadians claim to have achieved a better combination of properties in wrought Mg alloys. During the past few years, Dominion Magnesium Limited has been conducting a program designed to simplify the range of wrought Mg alloys while achieving higher mechanical properties and good workability. The new Zn-Zr alloy, ZK61, has figured prominently in this program. (Q general, Mg)

15-Q. A Survey of Creep in Metals. A. D. Schwope and L. R. Jackson. *National Advisory Committee for Aeronautics*, Technical Note 2516, Nov. 1951, 66 pages.

Summarizes numerous theories relating to creep phenomena and the extent of current knowledge on the subject. Various possible mechanisms by which creep occurs both in single crystals and in polycrystals. 199 ref. (Q3)

16-Q. Testing Hot Metal Ladles. K. E. Knudsen, W. H. Munse, and B. G. Johnson. *Proceedings of the Society for Experimental Stress Analysis*, v. 9, no. 1, 1951, p. 11-18.

Strains were measured with SR-4 electric strain gages, and deflections by means of deflection dials reading to 1/1000 in. (Q25)

17-Q. Some Unorthodox Procedures in Photoelasticity. A. J. Purelli and Rex L. Lake. *Proceedings of the Society for Experimental Stress Analysis*, v. 9, no. 1, 1951, p. 97-122.

A diffused light polariscope and some simplified techniques which, it is hoped, will make possible the production of stress patterns of reasonably good quality by those who have neither the time nor the in-

clination to develop the skills required by conventional methods. Creep properties in photo-formaldehyde plastics; use in 2-3 dimensional photo-elasticity. 10 ref. (Q25)

18-Q. Characteristics of Wire Gages Under Various Conditions. Harry Majors, Jr. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 1, 1951, p. 123-139, disc., p. 139-140.

An experimental program in which the variation of gage sensitivity from −310 to 140° F. is reported for wire gages type A-3 and A-15 mounted on steel and Constantan beams, respectively. 52 ref. (Q25, ST)

19-Q. Characteristics of Electric Strain Gages at Elevated Temperatures. Emmett E. Day. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 1, 1951, p. 141-150.

Results of a test in which the gage factor was checked against temperature for 21 commonly used commercial SR-4 strain gages. (Q25)

20-Q. An Optical Strain Gage for Use at Elevated Temperatures. P. R. Weaver. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 1, 1951, p. 159-162. (TG265 So13p)

An optical gage capable of operating at temperatures up to 500° F. It was designed and developed at the National Bureau of Standards for use in determining mechanical properties and for evaluating the performance of remote-reading strain gages at high temperatures. (Q25)

21-Q. Development and Use of High-Temperature Strain Gages. R. E. Gorton. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 1, 1951, p. 163-176.

Applications to engines. Various performance factors. (Q25)

22-Q. Resistance Wire Strain Gages in Product Development. W. H. Buckley and R. G. Anderson. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 1, 1951 p. 177-190.

Some applications of Baldwin SR-4 resistance-wire strain gages in product-development engineering, as well as some suggested methods and limitations in their use. (Q25)

23-Q. A Wire Resistance Strain Gage for the Measurement of Static Strains at Temperatures up to 1600° F. J. E. Carpenter and L. D. Morris. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 1, 1951, p. 191-200.

The application of high-temperature, wire-resistance strain gages to static testing. Techniques and apparatus used in fabricating and instrumenting the gage. The gage properties and some test results obtained by its use. (Q25)

24-Q. A Combined Stress Test Machine for Evaluating Heat-Resistant Alloys. William Foster. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 1, 1951, p. 211-220. (Q25, SG-h)

25-Q. A Realistic Approach to the Use of Titanium. Herman H. Hanink. *Product Engineering,* v. 22, Nov. 1951, p. 164-171.

Experimental work undertaken to determine mechanical properties of certain hot rolled and annealed alloys; effect of heat treatment on these properties; the difference in properties between forged parts and test-bar specimens; and behavior of machined Ti components subject to dynamic loading under simulated engine operating conditions. (Q general, Ti)

26-Q. Five Ways to Use Bonded-Wire Strain Gages. *SAE Journal,* v. 59, Nov. 1951, p. 28-29. (Excerpts from "Methods for Evaluating Loads and Stresses for Machine Design" by F. G. Tatnall.) (Q25)

27-Q. Many Ramifications of Wear Problem Discussed. V. A. Crosby. *SAE Journal,* v. 59, Nov. 1951, p. 30-31.

A survey on wear problems. Wear resistance of parts as related to the structure, hardness, and heat treatment of gray iron is stressed. (Q9, CI)

28-Q. Tests for SAE Grade 5 Bolts. A. S. Jameson. *SAE Journal,* v. 59, Nov. 1951, p. 54-59.

An investigation made to determine possible advantages in the use of torsion testing over tensile testing for the evaluation of bolts. Properties measured (proportional limit, torsional shear and degrees twist), correspond roughly to the three tensile properties: yield strength, tensile strength, and total elongation. (Q27, Q1, CN)

29-Q. The Fatigue Strength of Threaded Connections. R. C. A. Thurston. *Transactions of the American Society of Mechanical Engineers,* v. 73, Nov. 1951, p. 1085-1092.

Basic principles to be followed in the design of high-strength bolt and stud assemblies, the reasons underlying them and evidence in their support. Refers largely to steels. 31 ref. (Q7, ST)

30-Q. Buckling of Intermittently Supported Rectangular Plates. C. H. Norris, D. A. Polychrone, and L. J. Capozzoli. *Welding Journal,* v. 30, Nov. 1951, p. 546s-556s.

Studies of the buckling behavior of long rectangular plates intermittently supported on one or both long edges with various supports and loadings. Material studied was structural steel. (Q28, CN)

31-Q. Further Tests on Effects of Plastic Strain and Heat Treatment. Sadun S. Tor, Robert D. Stout, and B. G. Johnston. *Welding Journal,* v. 30, Nov. 1951, p. 576s-584s.

Covers transition-temperature test results of two plain carbon pressure-vessel steels in the following conditions: as-received, after 20% permanent tensile strain, after cylindrical bending and after hot or cold spherical pressing. (Q23, CN)

32-Q. Properties of Metals Used at Low Temperatures. *Welding Journal,* v. 30, Nov. 1951, p. 572s-575s.

A summary of nine papers previously published in the July 1951 issue of *Metal Progress* (Item 447-Q, 1951). Papers were presented at the Annual Metallurgical Conference and Open House held at the National Bureau of Standards on May 14 and 15, 1951. (Q general)

33-Q. High Strength Copper-Silver, Copper-Iron, and Copper-Iron-Chromium Wire. Webster Hodge, Ralph A. Happe, and Bruce W. Gonser. *Wire and Wire Products,* v. 26, Nov. 1951, p. 1033-1038, 1086.

Some new Cu-base alloys that have been made into wire to produce some unusual properties. The use of an insoluble metal like Fe, uniformly distributed as reinforcing fibers through the Cu matrix is an interesting new concept in wire making. (Q general, F28, Cu)

34-Q. A Study of Metal Transfer During Sliding, Using Radioactivation Analysis. E. Rabinowicz. *Proceedings of the Physical Society,* v. 64, sec. A, Oct. 1, 1951, p. 939-940.

A copper surface was slid over a steel surface, and as a result some Cu fragments were transferred to the steel. The steel specimen was then activated in a nuclear pile, and within a few hours of its removal from the pile an autoradiograph was made of its surface. Results are analyzed. (Q9, M23, Cu, ST)

35-Q. Cermets May Answer Jet Designers' Prayers. Parts I and II. W. J. Koshuba and J. A. Stavrolakis. *Iron Age,* v. 168, Nov. 29, 1951, p. 77-80; Dec. 6, 1951, p. 154-158.

While wear resistance, general high-temperature behavior and strength-to-weight ratio are good, cermets are less shock resistant, less ductile, and costly to produce. Applications in rockets, thermocouple protection tubes, induction-heating coils and electronic cathodes. (Q general, T25, T8)

36-Q. A Metallurgist Looks at Fracture. C. H. Lorig. *Metal Progress,* v. 60, Nov. 1951, p. 69-76.

Fracture aspect of metals. Demonstrates that microstructural features are responsible for several kinds of processes that can lead to fracture. Conditions of boundaries between grains and the nature of microconstituents at grain surfaces were studied. (Q26)

37-Q. Wrought Al-Zn-Mg Alloys. *Metal Progress,* v. 60, Nov. 1951, p. 114, 116, 118. (Condensed from "Observation on Some Wrought Aluminum-Zinc-Magnesium Alloys" by M. Cook, R. Chadwick and N. B. Muir.)

Previously abstracted from *Journal of the Institute of Metals.* See item 423-Q, 1951. (Q general, N12, Al)

38-Q. Properties and Uses of Lead and Its Alloys. W. H. Dennis. *Mine & Quarry Engineering,* v. 17, Dec. 1951, p. 391-394.

Emphasis is on mechanical properties. (Q general, T general, Pb)

39-Q. Mechanical Properties of Integrally Stiffened Aluminum Extrusions. Roberto Contini. *Product Engineering,* v. 22, Dec. 1951, p. 129-133.

Material properties, including values for skin and flanges, of integrally stiffened 24S and 75S Al alloy extrusions. Test results on behavior of tubular and flattened sections under column and bending loads. General comparison of data with design values. (Q general, Al)

40-Q. Heat Treated Brittle Coating Increases Sensitivity. A. J. Durelli and S. Okubo. *Product Engineering,* v. 22, Dec. 1951, p. 144-147.

Results of an investigation. Includes an example of a complete stress analysis using heat treated brittle coating on a valve under internal pressure. (Q25)

41-Q. The Nature of the Static and Kinetic Coefficients of Friction. Ernest Rabinowicz. *Journal of Applied Physics,* v. 22, Nov. 1951, p. 1373-1379.

Experiments were carried out to determine the transition between static and kinetic conditions when stationary metal surfaces are set into motion, a simple method being used which measures the energy that has to be given to one of the bodies to start it moving. The method is confined to cases in which the static coefficient exceeds the kinetic. 11 ref. (Q9)

42-Q. The Crystallographic Aspect of Slip in Body-Centered Cubic Single Crystals. I. Theoretical Considerations.

A. J. Opinsky and R. Smoluchowski. *Journal of Applied Physics,* v. 22, Nov. 1951, p. 1380-1384.

The mechanism of slip in body-centered cubic lattices is considered in terms of the relation between the orientation of the tensile axis and the active slip system. (Q24)

43-Q. Distribution of Slip in Metal Crystals. F. C. Frank. *Journal of Applied Physics,* v. 22, Nov. 1951, p. 1387.

Discusses previous literature findings on deformation in Zn crystals. (Q24, Zn)

44-Q. Surface Effect in the Cleavage of Zinc Monocrystals. John J. Gilman. *Journal of Metals,* v. 3, Dec. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1148-1149.

Certain normally ductile Zn monocrystals become extremely brittle when their surfaces are coated with Cu oxide or plate. Etching away the oxide layer made the crystal ductile again. Details of the phenomenon and possible mechanisms. (Q23, Q24, Zn)

45-Q. Change in Yield Strength During Aging in Iron. C. A. Wert. *Journal of Metals,* v. 3, Dec. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1179-1180.

Results of experiments on high-purity Fe (Puron). Aging was done at 40, 65, and 130° C., respectively, after carburizing to about 0.015% C. (Q23, Fe)

46-Q. New Aluminum Alloy Has Improved 600° F. Properties. *Iron Age,* v. 168, Dec. 13, 1951, p. 131.

Mechanical properties of "ML" alloy, developed by the Air Force for high-temperature use. Melting practice and pouring temperature. (Q general, E10, E23, Al, SG-h)

47-Q. Fatigue Strength of Nodular Iron Tested. T. E. Eagan. *Iron Age,* v. 168, Dec. 13, 1951, p. 136-139.

Tests were carried out on specimens cut from both standard cylinders and actual castings. Endurance ratio for the material is approximately 0.34. A 0.050-in. notch reduces fatigue strength by a factor of 1.3 for heat treated material, 1.45 for as-cast. Elongation is usually lower in castings than in keel blocks. (Q7, CI)

48-Q. Nickel Saved by Substituting 430 for 18-8. *Iron Age,* v. 168, Dec. 13, 1951, p. 144.

Chemistry and mechanical properties of Type 430 chromium stainless. (Q general, SS)

49-Q. Physical and Mechanical Properties of Cast Iron. W. Leighton Collins. *Mechanical Engineering,* v. 73, Dec. 1951, p. 979-982. (Based on "Engineering Properties of Cast Iron", *American Foundrymen's Society.*)

From the viewpoint of an engineer designing a load-resisting member. A design procedure is outlined. (Q general, T26, CI)

50-Q. A Study of Tracer Methods for Assessing Wear of Wire-Drawing Dies. J. C. E. Button, A. J. Davis, and R. Tourret. *Nucleonics,* v. 9, Nov. 1951, p. 34-43.

Irradiation of tungsten carbide dies was used to provide a means of measuring die wear. The activity of die debris adhering to drawn wires was then quantitatively measured by Geiger counters. (Q9, S19, F28, C-n)

51-Q. Creep of Annealed and Cold-Drawn High-Purity Copper. William D. Jenkins and Thomas G. Digges. *Journal of Research of the National Bureau of Standards,* v. 47, Oct. 1951, p. 272-287.

A study was made of the effect of temperature and stress on the creep behavior at 110, 250, and 300° F. of high-purity, oxygen-free, high-conductivity copper initially as annealed and as cold-drawn to 40% reduction of area. Correlations are made of changes in structure with time, stress, temperature, and discontinuous flow. (Q3, Cu)

52-Q. The M.I.T. Laboratory of Cryogenic Engineering. S. C. Collins, W. C. Nason, Jr., and R. L. Cannaday. *Refrigerating Engineering,* v. 59, Dec. 1951, p. 1179-1182.

Equipment includes liquid-nitrogen plant, helium refrigerator, helium liquefier, and a tensile-testing machine to study stresses of metals at very low temperatures. (Q27)

53-Q. Mechanical Properties of Arc-Cast and Powder Metallurgy Molybdenum. James H. Bechtold and Howard Scott. *Journal of the Electrochemical Society,* v. 98, Dec. 1951, p. 495-504.

A survey. Micrographs, tables, and graphs. 14 ref. (Q general, Mo)

54-Q. Report on Nodular Cast Iron. *SAE Journal,* v. 59, Dec. 1951, p. 23-24, 26.

Correlation of test-bar properties. Comparison is made with malleable iron, steel castings, and gray iron. (Q general, CI)

55-Q. Vibration Failures. E. Colston Shephard. *Machine Design,* v. 23, Dec. 1951, p. 157-160, 208.

How service behavior of gas-turbine buckets is recorded and analyzed for design data. Continuous strain-gage record is radioed from plane in flight to a trailer on the

ground. Diagrams show details of strain-gage system. (Q25)

56-Q. Inspection; NAI Students Design Unique Stress Testing Rings. James Corcoran. *Western Machinery and Steel World,* v. 42, Nov. 1951, p. 103-104.

New dynamometer test method and apparatus. (Q25)

57-Q. Resistance to Thermal Shock. C. M. Cheng. *Journal of the American Rocket Society,* v. 21, Nov. 1951, p. 147-153.

Resistance of ceramic and ceramal materials to thermal shock can be determined by analyzing the nonsteady thermal stresses in the material. First the nonuniform temperature distribution is computed by using the heat-conduction equation. This temperature distribution is then used to compute thermal stress. Coefficients of thermal conduction and of thermal expansion, ultimate strength, Young's modulus and Poisson's ratio together with heating conditions are used to specify resistance to thermal shock. The theory is verified by comparing the results with NACA test data. (Q25)

58-Q. Strengths of Several Steels for Rocket Chambers Subjected to High Rates of Heating. R. L. Noland. *Journal of the American Rocket Society,* v. 21, Nov. 1951, p. 154-162.

A series of tests was conducted to determine the tensile strengths of one carbon and 11 alloy steels when subjected to rates of heating comparable to those encountered by the metal parts of solid-propellant rocket motors. These results indicate that time at temperature has a very definite effect upon high-temperature strength characteristics of the steels investigated. (Q23, CN, AY)

59-Q. On the Transverse Mechanical Properties of Forgings. A. Bartocci. *Engineers' Digest,* v. 12, Nov. 1951, p. 377-378. (Translated from *Metallurgia Italiana.*)

Previously abstracted from original. See item 9-Q, 1951. (Q general, F22, CN)

60-Q. Development of Research in High-Temperature Rheology of Metals. (Continued.) Paul Feltham. *Metal Treatment and Drop Forging,* v. 18, Oct. 1951, p. 455-459.

New methods which are slowly coming into prominence rely upon a detailed examination of the structural changes induced by heat and stress, rather than on simple mechanical tests. Apparatus is diagrammed and illustrated; photomicrographs show typical results. 22 ref. (Q24)

61-Q. Structural Changes During the Creep of Aluminium. *Metal Treatment and Drop Forging,* v. 18, Nov. 1951, p. 520-524, 528. (Based on a paper presented by Crussard and Wyon to the Société Francaise de Métallurgie in Paris.)

Results of an investigation on structural changes which occur particularly at high temperatures. 14 ref. (Q3, M27, Al)

62-Q. Temper Brittleness. J. Lomas. *Machinery* (London), v. 79, Nov. 22, 1951, p. 904-906.

Effect of alloying elements. A distinction is made between temper brittleness and blue brittleness. (Q23, ST)

63-Q. High-Temperature Embrittlement in Chromium-Iron Alloys Containing 12-16% Chromium. Helmut Thielsch. *Metallurgia,* v. 44, Nov. 1951, p. 220-226.

Embrittlement which may be shown by ferritic stainless steels on heating at elevated temperatures. Grain growth is not responsible and the suggestion is made that the embrittlement may be related to effects caused by solution of carbide at elevated temperatures. Means whereby the carbide solution may be prevented, or its effects overcome. (Q23, N8, SS)

64-Q. Some Factors Affecting Wear on Cemented Carbide Tools. E. M. Trent. *Engineer,* v. 192, Nov. 9, 1951, p. 599-600; *Machinery* (London), v. 79, Nov. 8, 1951, p. 823-829; Nov. 15, 1951, p. 865-869.

Experiments were carried out to determine the temperatures at which carbides react with steel to give a molten phase. A theory of cratering wear on carbide tools is proposed. (Q9, C-n)

65-Q. A Theoretical Derivation of the Plastic Properties of a Polycrystalline Face-Centered Metal. J. F. W. Bishop and R. Hill. *Philosophical Magazine,* ser. 7, v. 42, Nov. 1951, p. 1298-1307.

It is conjectured that the work done in plastically deforming a polycrystal is approximately equal to that which would be done if the grains were free to deform equally. In conjunction with the principle of maximum plastic work, this enables the yield function of an aggregate to be calculated. This is done for an isotropic aggregate of face-centered cubic crystals, following a determination of the stresses needed to produce multi-slip. (Q24)

66-Q. Formula for Creep Curves of Metals. Ryukiti Robert Hasiguti and Tosiro Owadano. *Nature,* v. 168, Oct. 20, 1951, p. 706.

Based on experiments on Al. (Q3, Al)

67-Q. Effect of Hydrogen on the Properties of Low-Alloy Steels. J. D. Hobson and C. Sykes. *Journal of the Iron and Steel Institute,* v. 169, Nov. 1951, p. 209-220.

A method by which hydrogen is introduced into steel specimens by heating them in the gas at high pressures. Its deleterious effect on the ductility of a number of low-alloy steels was investigated and shown to be reproducible, provided that their treatment is also considered. 12 ref. (Q23, AY)

68-Q. Macroscopic Surface Stresses Produced by Plastic Deformation. G. B. Greenough. *Journal of the Iron and Steel Institute,* v. 169, Nov. 1951, p. 235-241.

An investigation using a low-carbon steel containing 0.10% C., 0.36% Mn, 0.017% Si, and 0.007% P. Results show that there is a macroscopic compressive biaxial stress in the surface of an aggregate; the layer containing the stress being about two crystals ($8X10^{-3}$ in.) deep. 12 ref. (Q24, CN)

69-Q. The Fatigue of Metals; Grooved Parts. (In French.) M. Ros. *Revue de Métallurgie,* v. 48, Oct. 1951, p. 723-733.

Correlates results of tests made by LFEM during past 20 years, demonstrating that the Coulomb-Mohr theory can be considered as a general theory of the rupture of metals. (Q7)

70-Q. Behavior and Basic Principles of Metallic Structures. (In French.) J. F. Baker. *Revue de la Soudure; Lastijdschrift,* v. 7, No. 3, 1951, p. 128-146.

A review on the basis of the literature, with special regard to the ductility of steel. 37 ref. (Q23, ST)

71-Q. Pendulum Hysteresis Meter or Torsion Pendulum With Double Elastic Device for Measuring Internal Friction and Elastic Modulus of Metals in an Extensive Range From Very Low Temperatures up to 1300°. (In French.) Christian Boulanger. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 233, Oct. 1, 1951, p. 732-733.

Tests and results obtained with the above instrument. (Q21, Q22)

72-Q. Relation Between Internal Friction and Resistance to Creep of Steel as a Function of Microstructure. (In French.) Christian Boulanger, Georges Delbart, and Michel Ravery. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 233, Oct. 8, 1951, p. 794-796.

Results of study in which four different steel microstructure types were investigated. (Q22, Q3, M27, ST)

73-Q. Use of an Ethoxyline Resin in Three-Dimensional Photo-Elasticimetry According to a Solidification Technique. (In French.) Michel Ballet and Gaston Mallet. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 233, Oct. 15, 1951, p. 846-847.

Comparison with a similar study by N. C. Foster. (Q25)

74-Q. Special Mechanical Properties of Aluminum Alloys Having a High Yield Point and High Tensile Strength. (In French.) Marcel Tournaire. *Revue de l'Aluminium,* v. 28, Oct. 1951, p. 353-361.

Effects of fabrication process on mechanical properties, giving the best yield and tensile strengths attainable with various common Al alloys. (Q23, Al)

75-Q. The Heat Resistance of Cast Iron and the Effect of Different Alloying Elements. (In German.) H. Timmerbeil, G. Clas, and O. Mattern. *Giesserei,* v. 38, (new ser., v. 4), Sept. 20, 1951, p. 476-482; Oct. 4, 1951, p. 523-526.

Review of literature. Heat resistance of normal cast iron, Si cast iron, Cr-Si cast iron, and Al-Si cast iron. Part II reports on experiments on the influence of P on the heat resistance of gray iron castings, and also on Si, Cr-Si, and Al-Si cast iron. An alloy of 1.85% C, 6% Si, 0.6% P, $<$ 0.025% S, 4% Al and about 0.2% Ti proved to be particularly heat resistant.
(Q general, CI, SG-h)

76-Q. Aluminum - Zinc - Magnesium Base Alloys. (In German.) H. Hug. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 17, Oct. 1951, p. 289-298.

Compositions, mechanical properties, transformations, and microstructures of various Al-Zn-Mg compositions. Only those which contain mostly Al are considered.
(Q general, N general, M27, Al)

77-Q. Testing Heat Resistant Materials. (In German.) W. Deisinger. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 17, Oct. 1951, p. 299-305.

Absence of uniform standards of high-temperature property testing. Various methods of determining mechanical properties of metals and alloys at elevated temperatures. 10 ref. (Q general, SG-h)

78-Q. The Influence of Precipitation Processes Upon the Determination of Creep Resistance of Light-Metal Alloys. (In German.) H. Vosskühler. *Metall,* v. 5, Nov. 1951, p. 475-479.

In order to avoid structural

changes during creep testing of light alloys, preliminary heating of the test rods is suggested. Method for the tests. Results seem most significant for Al-Mg alloys containing 8.50% Mg. 15 ref. (Q3, Al)

79-Q. The Hypothesis of Supporting Crystals in Metal Alloys for Bearings. (In German.) V. Schneider. *Metall,* v. 5, Nov. 1951, p. 490-494.

Application of the hypothesis to various bearing metals, in order to explain their frictional characteristics. It was found that other characteristics are more important for determining the suitability of an alloy for bearings. (Q9, T7, SG-c)

80-Q. Alternate Torsion Testing of Wires. (In Italian.) *Metallurgia Italiana,* v. 43, Oct. 1951, p. 421-424.

During the test, three distinct periods are evident: uniform deformation, localized deformation in a short length, and rupture. Results of application of this test to steels and several nonferrous alloys. (Q1)

81-Q. Some Data on the Influence of Forging Reduction on the Toughness of High Speed Steel. (In Italian.) Giorgio Magliano. *Metallurgia Italiana,* v. 43, Oct. 1951, p. 439-442.

Results of tests on round bars already reduced 50-96% in an attempt to reduce the minimum forging reduction necessary to obtain satisfactory core properties. Such reduction does not appear to be feasible. (Q23, F22, TS)

82-Q. Quality and Methods of Testing of Hoes. (In Portuguese.) Joao Gustavo Haenel and Rubens Lima Pereira. *Boletim da Associacao Brasileira de Metais,* v. 7, July 1951, p. 247-282.

A detailed comparative study of the technological characteristics of various kinds of Brazilian steel hoes in relation to well-known foreign-make steel hoes. (Q general, ST)

83-Q. Study of Properties of Sintered Steels. (In Portuguese.) Vicente Chiaverini and Carlos de Revoredo Barros. *Boletim da Associacao Brasileria de Metais,* v. 7, July 1951, p. 346-365.

Results of experiments on mechanical and physical properties using sintered steel of different compositions and method of preparation. (Q general, P general, ST)

84-Q. (Book) Simplified Mechanics and Strength of Materials. Harry Parker. 215 pages. John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. $4.00.

A survey of all the mechanical forces to be considered in construction. Specific applications to columns, rivets and welds, shafts, pipes, tanks, concrete retaining walls and dams. A wide variety of illustrative problems; also tables of allowable stresses, properties of sections, and other engineering data. (Q23, Q25)

85-Q. Plastic-Wave Propagation Effects in High-Speed Testing. E. H. Lee and H. Wolf. *Journal of Applied Mechanics,* v. 18, *(Transactions of the American Society of Mechanical Engineers,* v. 73), Dec. 1951, p. 379-386.

A material test carried out at high speed may be markedly influenced by plastic-wave propagation effects. In such a case, variation of strain occurs along the test specimen, and the stress-strain relation cannot be determined from measurements made on the specimen as a whole. The theoretical plastic-wave analysis of a particular test arrangement is given. Range of speed is determined which permits satisfactory interpretation without need for detailed analysis of plastic-wave propagation. Application to other test arrangements. (Q27)

86-Q. Protecting Refinery Pressure Equipment From Graphitization. D. B. Rossheim, J. J. Murphy, R. H. Caughey, and Q. B. Hoyt. *Petroleum Processing,* v. 6, Dec. 1951, p. 1385-1388.

Results of studies of carbon and low-alloy steel metal deterioration in some catalytic-cracking equipment. Precautions to be taken and materials for new construction. Causes of cracking, including stresses in bimetallic construction. (Q25, N8, CN, AY)

87-Q. Flexural Fatigue Strengths of Riveted Box Beams—Alclad 14S-T6, Alclad 75S-T6, and Various Tempers of Alclad 24S. I. D. Eaton and Marshall Holt. *National Advisory Committee for Aeronautics,* Technical Note 2452, Nov. 1951, 25 pages.

Results of an investigation. 11 ref. (Q7, Al)

88-Q. Melt Quality and Fracture Characteristics of 85-5-5-5 Red Brass and 88-8-4 Bronze. R. D. Shelleng, C. Upthegrove, and F. B. Rote. *Transactions of the American Foundrymen's Society,* v. 59, p. 67-76; disc., p. 76-78.

Previously abstracted from Preprint 55. See item 284-Q, 1951. (Q26, E25, Cu)

89-Q. Mechanical Properties of Cast Steel as Influenced by Mass and Segregation. John F. Wallace, John H. Savage, and Howard F. Taylor. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 223-242; disc., p. 242-243.

Investigation on four heats of various low-alloy steels. (Q general, M27, ST)

90-Q. Effect of Vanadium on the Properties of Cast Chromium-Molybdenum Steels. N. A. Ziegler, W. L.

Meinhart, and J. R. Goldsmith. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 261-274; disc., p. 274-275.

Previously abstracted from Preprint 2. See item 281-Q, 1951.
(Q general, M27, N8, K9, CI)

91-Q. Influence of Silicon Content on Mechanical and High-Temperature Properties of Nodular Cast Iron. W. H. White, L. P. Rice, and A. R. Elsea. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 332-345, disc., p. 345-347.

Previously abstracted from Preprint 5. See item 282-Q, 1951.
(Q general, P general, CI)

92-Q. Silicon-Chromium Alloy in Complicated Iron Castings. Ralph A. Clark. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 401-409; disc., 409-411.

Four automobile cylinder castings were poured from cylinder grades of cast iron alloyed in various ways. Mechanical properties were determined for the various specimens. Variations in cooling rate brought about wide variations in microstructure and hardness.
(Q general, M27, E25, CI)

93-Q. Effect of Phosphorus Content on Mechanical Properties of a Nodular Cast Iron. J. E. Rehder. *Transactions of the American Foundrymen's Society,* v. 59, p. 501-508; disc., p. 508.

Previously abstracted from Preprint 43. See item 283-Q, 1951.
(Q general, E25, CI)

94-Q. A Castability and Property Comparison of Several Magnesium-Rare Earth Sand Casting Alloys. K. E. Nelson and F. P. Strieter. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 532-543; disc., p. 543-545.

Castability and tensile and creep properties of aircraft engine castings made from a group of Mg-rare earth alloys were investigated.
(Q27, Q3, E25, Mg)

95-Q. The Influence of Surface Films on the Friction, Adhesion, and Surface Damage of Solids. F. P. Bowden. *Annals of the New York Academy of Sciences,* v. 53, art. 4, June 27, 1951, p. 805-823.

Reviews some recent experimental investigations on the part played by surface films in the friction and adhesion of solids. The bearing of these results on the theory of friction. 16 ref. (Q9)

96-Q. Measurement of the Incremental Friction Coefficient of Several Homologous Series of Straight-Chain Hydrocarbon Compounds. S. F. Murray and J. T. Burwell. *Annals of the New York Academy of Science,* v. 53, art. 4, June 27, 1951, p. 906-918.

Coefficient was measured as a function of rotation of one low-carbon steel cylinder against another one for a number of straight-chain polar hydrocarbons, which included alcohols, acids, amines, and two esters. Five of the alcohols were also tested using 24S-T Al alloy cylinders. 15 ref. (Q9, CN, Al)

97-Q. Influence of Roughness and Oxidation on Wear of Lubricated Sliding Metal Surfaces. C. B. Davies. *Annals of the New York Academy of Science,* v. 53, art. 4, June 27, 1951, p. 919-935.

Measurements were made, at room temperature, of the wear of a flat steel annulus flooded with lubricant and pressing against the lower end of a small vertical cylindrical tungsten carbide pin. In another apparatus, reciprocating motion produced rubbing of Ag-Cu combinations and mild steel against Ni-Cr steel in oxygen, nitrogen, or air. Effects of surface-active agents and of other chemicals on wear and corrosion were studied.
(Q9, R2, Ag, Cu, CN, AY)

98-Q. The Luders Deformation of Mild Steel. *Proceedings of the Physical Society,* v. 64, ser. B. Dec. 1, 1951, p. 1085-1086.

Experiments extended to the "blue-brittle" range—around 200° C. Here the deformed area just beyond the Lüders front ages very rapidly during the test, so that yield stress in this region is much above applied stress. After testing, marked curvature remains in the sample.
(Q24, CN)

99-Q. Abrasion and Polishing, Friction and Wear. P. Dinichert. *Microtecnic* (English Ed.), v. 5, Sept.-Oct. 1951, p. 225-232.

The necessity for considering submicroscopic or even atomic dimensions when questions on the above are dealt with. Reference to this phenomenon in metals. (Q9, L10)

100-Q. New Applications of the Micromachine Type MI/44. S. A. Sadamel. *Microtecnic* (English Ed.), v. 5, Sept.-Oct. 1951, p. 233-240.

Machine for tensile testing of metal wires and strips and of textile threads and fibers. Tests on 18-8 stainless cold worked wire are shown as examples. (Q27, SS)

101-Q. Study of Some Properties of Nodular Graphite Cast Irons. (Concluded) (In French.) Marcel Ballay, Raymond Chavy and Jacques Grilliat. *Fonderie,* Oct. 1951, p. 2636-2651, disc, p. 2651-2652.

Mechanical properties, technique of tensile testing, comparison with properties of American malleable cast iron, and comparison of cast

iron and steel ductility.
(Q general, Q27, CI)

102-Q. Creep Tests on Steel Wire at Room Temperature. (In German.) Alfred Krisch. *Archiv für das Eisenhüttenwesen,* v. 22, Sept.-Oct. 1951, p. 313-316.

Tests were made over a period of more than 1000 hr. on five patented steel wires and on one type of wire subjected to a final oil quench. Details of tests; behavior of the wires in reinforced concrete. 10 ref.
(Q3, ST)

103-Q. Mathematics of the Tensile Test. (In German.) Hans Kostron. *Archiv für das Eisenhüttenwesen,* v. 22, Sept.-Oct. 1951, p. 317-324; disc., p. 324-325.

Proposes equation making possible the calculation of various stresses. Practical application of mode of calculation is indicated. 16 ref. (Q27)

104-Q. Correlation Between Stress and Deformation Gradient. Part 2. Influence of Form and Scale. (In German.) Franz Bollenrath and Alex Troost. *Archiv für das Eisenhüttenwesen,* v. 22, Sept.-Oct. 1951, p. 327-335.

Theoretically investigates and diagrams a new method for designating the influence of irregular stress and deformation distribution upon the hindering of plastic deformation. The terms used are indexed. Practical application is suggested. 11 ref.
(Q23)

105-Q. The Behavior of Sintered Iron During Nitriding. (In German.) Werner Koster and Josef Raffelsieper. *Archiv für das Eisenhüttenwesen,* v. 22, Sept.-Oct. 1951, p. 337-341.

Microstructure, density, hardness, and bend strength of various Fe-powder sintered bodies were determined.
(Q29, Q5, P10, M27, J28, Fe)

106-Q. A Survey of Recent Research on Creep of Engineering Materials. Joseph Marin. *Applied Mechanics Reviews,* v. 4, Dec. 1951, p. 633-634.

48 references. (Q3)

107-Q. The Effect of Hydrogen on Steel and Formation of Hair-Line Cracks. A. B. Chatterjea and B. R. Nijhawan. *Current Science,* v. 20, Apr. 1951, p. 20, 90-91. (Reprint)

A review. 26 ref. (Q general, ST)

108-Q. A Piezoelectric Method for Determining Young's Modulus and Its Temperature Dependence. H. E. Stauss, F. E. Martin, and D. S. Billington. *Journal of the Acoustical Society of America,* v. 23, Nov. 1951, p. 695-696.

A resonance method for determining Young's modulus in metals is based on support of the specimen at its central node for longitudinal vibrations, with the supporting rod articulating at its lower end with a piezoelectric crystal. Utility of the method was extended by adapting it to measurement of changes in Young's modulus with temperature.
(Q21)

109-Q. Use of Rare Earth Metals in Magnesium Casting Alloys. J. C. McDonald. *Light Metal Age,* v. 9, Dec. 1951, p. 13-14, 16.

Characteristics sought in casting alloys for service at elevated temperatures. Mechanical properties and behavior in the foundry of Mg—rare earth metal alloys. Advantages over Mg-Al-Zn type alloys.
(Q general, E25, Mg, SG-h)

110-Q. The Hardness Test as a Measure of Micro-Porosity in Aluminum and Magnesium Castings. Harry Czyzewski. *Light Metal Age,* v. 9, Dec. 1951, p. 24, 26.

Method utilizing simple hardness testing and charting of data for the control of microporosity. Considerably simplifies the production control of this factor. Advantages and practical applications of this method. (Q29, E25, Al, Mg)

111-Q. Scales for Determining Stiffness and Strength of Structural Metals. *Materials & Methods,* v. 34, Dec. 1951, p. 107.

A series of logarithmic scales arranged to provide a means for finding the relative sheet, plate, or beam thickness required for various metals of equal stiffness or equal strength, respectively.
(Q23, ST, Cu, Ti, Al, Mg)

112-Q. Influence of Microstructure on Creep Resistance. Georges Delbart and Michael Ravery. *Metal Progress,* v. 60, Dec. 1951, p. 62-68.

Results of an investigation. Material used was a Cr-Mo steel. Tests showed that there was a strong influence of microstructure on the surface performance of low-alloy, high-temperature steels. Data are tabulated and graphed. Micrographs.
(Q3, M27, AY, SG-h)

113-Q. Simple Tester for Hardness of Hot Materials. R. F. Domagala and W. R. Johnson. *Metal Progress,* v. 60, Dec. 1951, p. 72-73.

A rapid, reproducible method for testing hot hardness of materials at temperatures approaching their melting points. Examples of tests on Mo, Si, and VSi_2. (Q29, Mo, Si)

114-Q. Properties of Nimonic Alloys. *Metal Progress,* v. 60, Dec. 1951, p. 80-B.

Charts and tables on the chemical composition, physical and mechanical properties, and heat treatments

of Nimonic Alloys.
(Q general, P general, J23, J27, Ni)

115-Q. Jigs for Positioning Keyhole Notch. C. D. Foulke. *Metal Progress,* v. 60, Dec. 1951, p. 81.

Two jigs for the uniform preparation of keyhole notch-impact specimens. (Q6)

116-Q. High Purity Zirconium Metal. F. B. Litton. *Metal Progress,* v. 60, Dec. 1951, p. 83-86.

Results of an investigation. The work-hardening curves for iodide and arc melted iodide zirconium were similar, except that approximate maximum hardnesses were attained at 70 and 60% cold reduction, respectively. The maximum hardness was Rockwell A-52 for both materials after 90% cold reduction. The penetration of O_2 into Zr at 1020, 1380 and 1740° F. was determined for 2-hr. heating periods in still air. Hardness measurements showed that approximately 0.35-mm. penetration occurred at 1380 and 1740° F. Micrographs. (Q29, Q24, Zr)

117-Q. Shock Wave Propagation in Metals. Werner Goldsmith. *Metal Progress,* v. 60, Dec. 1951, p. 92-96.

Shock loading represents the exact opposite of static loading and consists of the instantaneous application of an external force to a structural member. Types of waves resulting from impact loading are compression waves, rarefaction, shear, bending, and two types of surface waves. Tests were conducted on mild steel. (Q6, CN)

118-Q. Fracture of Metals. *Metal Progress,* v. 60, Dec. 1951, p. 148, 150. (Condensed from "The Fracture Process in Plastic Metals", Ya. G. Fridman and T. K. Zilova.)

Previously abstracted from *Doklady Akademii Nauk SSSR.* See item 780-Q, 1950. (Q26, ST)

119-Q. Strains and Stresses. *Metal Progress,* v. 60, Dec. 1951, p. 162, 164. (Condensed from "Concentration of Strains and Stresses at Large Plastic Strains," Ya. B. Fridman and T. K. Zilova).

Previously abstracted from *Doklady Akademii Nauk SSSR.* See item 835-Q, 1950. (Q24, Q25)

120-Q. A Study of Elastic and Plastic Stress Concentration Factors Due to Notches and Fillets in Flat Plates. Herbert F. Hardrath and Lachlan Ohman. *National Advisory Committee for Aeronautics,* Technical Note 2566, Dec. 1951, 23 pages.

Six large 24S-T3 Al alloy sheet specimens containing various notches or fillets were tested in tension to determine their stress concentration factors in both the elastic and plastic ranges. Diagrams and graphs. 12 ref. (Q27, Al)

121-Q. A Study of Slip Formation in Polycrystalline Aluminum. Aldie E. Johnson Jr., and S. B. Batdorf. *National Advisory Committee for Aeronautics,* Technical Note 2576, Dec. 1951, 18 pages.

Experimental results shed light on the assumptions that have been made in several attempts to bridge the gap between physical and mathematical theories of plasticity. The results are compatible with, but do not necessarily verify, the conception that plastic deformation in strain-hardening materials is primarily due to slip. Photomicrographs. (Q24, Al)

122-Q. On the Angular Distribution of Slip Lines in Polycrystalline Aluminum Alloy. John M. Hedgepeth, S. B. Batdorf, and J. Lyell Sanders, Jr. *National Advisory Committee for Aeronautics,* Technical Note 2577, Dec. 1951, 18 pages.

An attempt to assess quantitatively the adequacy of a model used by examining the statistical distribution of slip angles—those angles which express the orientation of slip lines. Theoretical distributions are derived on the basis of the model and are compared with an experimental distribution obtained from previous investigations. Photomicrographs. (Q24, Al)

123-Q. Relations Beteen the Modulus of Elasticity of Binary Alloys and Their Structure. Werner Koster and Walter Rauscher. *National Advisory Committee for Aeronautics,* Technical Memorandum 1321, Nov. 1951, 49 pages. (Translated.)

Previously abstracted from *Zeitschrift für Metallkunde.* See item 4C-19, 1949. (Q21, M27)

124-Q. Elevated Temperature Properties of Titanium Carbide Base Ceramals Containing Nickel or Iron. A. L. Cooper and L. E. Colteryahn. *National Advisory Committee for Aeronautics,* Research Memorandum E51110, Dec. 3, 1951, 47 pages.

The properties studied were oxidation, modulus of rupture, tensile strength, and thermal-shock resistance. Metallographic structure was studied. Tables, graphs, and micrographs. 13 ref.
(Q general, R2, M27, C-n, Ti)

125-Q. Formula for Creep Curves of Metals. E. N. Da C. Andrade. *Nature,* v. 168, Dec. 8, 1951, p. 1007.

Compares a 3-constant and a 4-constant formula. (Q3)

126-Q. Damping Capacity Measurements as an Aid to the Metallurgist. E. Linacre. *Research,* v. 4, Dec. 1951,

p. 540-541.

Technique of damping capacity measurements. Use in determination of diffusion coefficients, grain size, intensity of magnetization and phase change on transformation. (Q8, M23)

127-Q. Some Experience With Boiler Plate in Penstock Construction. W. Müller. *Sulzer Technical Review,* no. 2, 1951, p. 12-24.

Examples of difficulties encountered with plate material for high-pressure pipe lines, and suggestions as to how they can be avoided or remedied. Includes information on mechanical properties, specifications, inspection, welding, and heat treatment. (Q general, S21, S22, CN)

128-Q. The Development of Aluminum-6 Per Cent Magnesium Wrought Alloys for Elevated-Temperature Service. K. Grube and L. W. Eastwood. *U. S. Atomic Energy Commission,* AECD-3003, July 15, 1950, 28 pages.

It was found that addition of 0.5% Cr and approximately 0.10% Ti produces an alloy which, after stabilization at 600° F. prior to test, has higher tensile properties at room temperature and at 600° F. than does 24S. Data are tabulated and graphed. (Q27, Al)

129-Q. Development of Low Alloy High Tensile Structural Steel. I. M. Mackenzie and J. M. Pow. *West of Scotland Iron and Steel Institute Journal,* v. 57, 1949-50, p. 85-116; disc., p. 117-124.

The effect of composition and heat treatment on resistance to plastic deformation, resistance to rupture, ability to relieve local stress concentrations, and ease of fabrication with particular reference to economic considerations. The importance of basing design on a proof-stress criterion in order to obtain the maximum benefit from high-tensile steels is emphasized. Recent developments in the C-Mn and Mn-Mo type of steels. (Q23, Q25, AY)

130-Q. Symposium on Residual Elements in Steel. Factors Affecting the Rolling and Hot Working of Mild Steel Plates. E. C. Houston. **The Effect of Residual Elements in Steel on the Manufacture of Steel Tubes.** W. A. Smith. **Residual Elements in Steel.** H. Harris. *West of Scotland Iron and Steel Institute Journal,* v. 57, 1949-50, p. 193-235; disc., p. 236-241.

Causes of defects which may arise during the hot processing and welding of mild steel plates and tubes. Effects of high sulfur resulting from pick-up from the furnace atmosphere or from segregation. Effect of residual alloys. Small quantities of Sn, Cu, and Ni were shown to have a bad effect as determined by hot bend tests. Method of scale formation and the formation of low melting point constituents in the scale resulting in grain-boundary attack. Results are tabulated, graphed, and illustrated.
(Q general, F23, F26, CN)

131-Q. Hard Metals (Sintered Carbides) as Tools for Cold Working Operations. (In Czech.) M. Petrdlik. *Hutnické Listy,* v. 6, Oct. 1951, p. 484-489.

Production of hard alloys of the WC-Co type containing up to 30% Co. Variations in mechanical properties with Co content. Three examples of the use of hard metals containing a high percentage of Co for cold working operations. Diagrams, graphs, tables, and illustrations.
(Q general, T5, C-n)

132-Q. Determination of Residual Strains in Sintered Pieces. (In French.) J. Pomey, F. Goutel, and L. Abel. *Métaux: Corrosion-Industries,* v. 26, Sept. 1951, p. 347-356; Oct. 1951, p. 377-391.

Macroscopic strains due to anisothermic hardening were investigated. Part I reviews the problem. Part 2: Superficial measures deduced from Hertzian hardness with respect to preliminary strains, explored points, and corresponding Mohr circles; superficial strains after cementation and hardening; and application to carbonitrided surfaces. Part 3: Methods for determining strains inside sintered bodies. Part 4: Applications of the various methods. (Q25)

133-Q. Results of Fatigue Tests Under Increasingly Heavy Loads. (In French.) Marcel Prot. *Revue de Métallurgie,* v. 48, Nov. 1951, p. 822-824.

Advantages of this technique. Data are charted for various steels, Al and Mg alloys. (Q7, ST, Al, Mg)

134-Q. Micrographic Study of the Temper Brittleness of Low Alloy Carbon Steel. (In French.) *Revue de Métallurgie,* v. 48, Nov. 1951, p. 825-852.

New information concerning micrographic technique and results and possibilities of its application to detecting temper brittleness and its causes. Micrographs and tables. 16 ref. (Q23, M21, AY)

135-Q. Study of the Temper Brittleness of Certain Steels by X-Ray Diffraction. (In French.) Adrienne R. Weill. *Revue de Metallurgie,* v. 48, Nov. 1951, p. 853-857.

Results of experiments using X-ray diffraction for distinguishing between a piece of steel in the tough state and the brittle state. Data are tabulated. (Q23, M22, ST)

136-Q. Application of the Microsclerometric Meyer Analysis to Temper

Brittleness. (In French.) H. Bückle. *Revue de Métallurgie,* v. 48, Nov. 1951, p. 858-863.

Results of experiments of other investigators on above for low-alloy steels. Tables and graphs. 24 ref. (Q23, Q29, AY)

137-Q. Influence of Temperature on the Elastic Constants of Metals and Alloys. (In French.) Georges Vidal, Pierre Lescop, and Louis Raymondin. *Revue de Métallurgie,* v. 48, Nov. 1951, p. 864-874; disc., p. 874.

Brief discussion from the physical, metallographic, and mechanical points of view. Tables, diagrams, and graphs. 14 ref. (Q21)

138-Q. Study of the Internal Disorientation in Aluminum-Magnesium Alloy Single Crystals Subjected to Plastic Deformation. (In French.) J. Hérenguel and P. Lelong. *Revue de Métallurgie,* v. 48, Nov. 1951, p. 875-878.

Two methods are use of Lacombe's etching reagent and anodic oxidation of thin films of an Al+3% Mg alloy. Photomicrographs and diagrams. (Q24, M26, Al)

139-Q. Crystal Displacements in a Monocrystalline Sheet of Aluminum During Rolling. (In French.) Raymond Jacquesson and Jack Manenc. *Revue de Métallurgie,* v. 48, Nov. 1951, p. 883-887.

See abstract from *Comptes Rendus,* item 351-Q, 1951. (Q24, Al)

140-Q. Creep and Relaxation of Drawn Wires. (In French.) Robert de Strycker. *Revue de Métallurgie.* v. 48, Nov. 1951, p. 888-893, disc., p. 893.

Details of test procedure and influence of natural and artificial aging on relaxation properties. Data are tabulated and discussed for patented and drawn steel wire. (Q3, ST)

141-Q. Influence of Surrounding Medium on Plastic Deformation of Metals. (In Italian.) Georges Masing. *Metallurgia Italiana,* v. 43, Nov. 1951, p. 467-470.

Conclusions of Rehbinder and coworkers are confirmed, except for effect on electrical resistance. Theoretical analysis of the observations. (Q24, P15)

142-Q. Increase of Fatigue Strength of Welded Joints by Surface Peening. I. V. Kudriatsev and N. M. Savvina. (In Russian.) *Avtogennoe Delo,* v. 22, Apr. 1951, p. 8-12.

Cylindrical, plate, and channel-beam fatigue specimens were prepared by butt and lap arc welding and were given various stress relief and peening treatments. Data are tabulated and charted. 14 ref. (Q7, G23, CN)

143-Q Dynamic Coefficient During Concentrated Loading. (In Russian.) V. N. Danilov. *Doklady Akademii Nauk SSSR,* new ser., v. 78, June 21, 1951, p. 1135-1136.

Dynamic coefficient is defined. Soft steel, red brass, Al, Pb, Sn, and a Sn-Pb alloy are included in the investigation. Data are charted. (Q27, CN, Cu, Al, Pb, Sn)

144-Q. The Relationships of Properties in the Series of Metals Copper-Silver-Gold. (In Russian.) Sh. Ia. Korovskii. *Zhurnal Obshchei Khimii,* v. 21 (83), Mar. 1951, p. 429-432.

Regularities and variations of mechanical and physical properties of this series of metals. Data are tabulated. (Q general, P general, Cu, Ag, Au)

145-Q. Directional Hardness Differences in Silicon Carbide Crystals. W. Stern. *Industrial Diamond Review,* new ser., v. 11, Nov. 1951, p. 237-239; Dec. 1951, p. 255.

Tests show that the grinding and polishing direction is a factor in the life and performance of various carbides. (Q29, G18, Si, C-n)

146-Q. New Hardness and Wear Testers. *Industrial Diamond Review,* new ser., v. 11, Dec. 1951, p. 261-263.

New apparatus for testing shear and scratch hardness, cutting resistance and machinability of metals. (Q29, Q9)

147-Q. English Use Boron in Normalized and Drawn Heavy Sections. W. E. Bardgett. *Iron Age,* v. 169, Jan. 10, 1952, p. 81-84.

Evaluates the addition of boron to low-alloy and low-carbon steels. Effect on tensile and yield stress. Effect of Mo in varying amounts. (Q27, AY)

148-Q. Ingot Mould Irons; Mechanical Properties. J. W. Grant. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 590-594; disc., p. 605.

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 495-Q, 1951. (Q general, CI)

149-Q. Poisson's Ratio; Variations in Cast Iron for Ingot Moulds. J. Woolman. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 594-596.

It is important to have some knowledge of Poisson's ratio so that an estimation of stresses induced in ingot molds will be as accurate as possible. Results are tabulated and discussed. (Q21, T5, CI)

150-Q. Ingot Moulds; Determination of Surface Stresses. M. W. Buttler and W. H. Glaisher. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 600-604; disc., p. 639-644.

Previously abstracted from the *Journal of the Iron and Steel Institute.* See item 498-Q, 1951. (Q25, CI)

151-Q. Iron and Fe-Mn Alloys; Tensile and Impact Properties. W. P. Ress, B. E. Hopkins, and H. R. Tipler. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 616-621.

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 13-Q, 1952. (Q23, Q27, Q6, Fe)

152-Q. Segregates; Physical and Mechanical Properties in Two Alloy Steels. H. M. Finniston and T. D. Fearnehough. *Iron and Steel,* v. 24, Dec. 15, 1951, p. 621-626.

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 680-Q, 1951. (Q general, M27, AY)

153-Q. Experimental Survey of Low-Load Hardness Testing Instruments. A. R. G. Brown and E. Ineson. *Journal of the Iron and Steel Institute,* v. 169, Dec. 1951, p. 376-388.

Reviews the literature. The available low-load hardness testers, and method of operation used. Sources of error in hardness determinations. Results are tabulated. 48 ref. (Q29)

154-Q. Softening of Metals During Cold-Working. N. H. Polakowski. *Journal of the Iron and Steel Institute,* v. 169, Dec. 1951, p. 337-346.

A theory relating indentation hardness and energy stored in a cold worked metal is put forward as a tentative explanation of both the Bauschinger effect and work softening. To satisfy this theory, quenched and tempered steels should soften during the early stages of cold working, and they are shown experimentally to do so. This accounts for the low rate of work hardening during reversed and cross-rolling of sheets, reversed deep drawing, and during cold working and fatigue testing of heat treated steels. The softening effect provides an explanation of the recrystallization and mechanical properties of single and polycrystalline metals after reversed deformation. 48 ref. (Q24, N5, Cu, Ni, Al, ST)

155-Q. The Creep of Metals and Creep-Resistant Alloys. A. H. Sully. *Murex Limited Review,* v. 1, No. 9, 1951, p. 211-228.

Analyzes creep in metals. Factors which influence creep, and compositions of creep resistant alloys. Utilization of creep test data as it affects engineering design. Structural phenomena and physical theory of creep. (Q3)

156-Q. An Improved Creep Measuring and Recording System. J. W. Huffman. *Product Engineering,* v. 23, Jan. 1952, p. 172-174.

Method developed by Engineering Research Laboratory, North American Aviation, Inc. (Q3)

157-Q. Dilastrain Method Speeds Research by Cutting Endurance Limit Test Time. *Product Engineering,* v. 23, Jan. 1952, p. 193.

Rapid and accurate method for determining the endurance limit of metals and plastics, used for moving mechanical parts such as turbine blades, aircraft propellors, drive shafts and the like, devised at Rensselaer Polytechnic Institute. This new development, called the R/S Dilastrain method, should speed the search for new alloys and materials by sharply reducing testing time. (Q7)

158-Q. Wear From the Manufacturer's View-Point. G. A. P. Hunt. *Australasian Engineer,* Nov. 7, 1951, p. 62-69.

The meaning of wear and how it can be measured. How wear is related to microstructure, to the pressure between the rubbing surfaces, and to casting cross-sectional area. Wear properties of various cast-iron structures. (Q9, CI)

159-Q. The Character of Spontaneous Initial Deformation. (In German.) Gotthold Müller and Werner Engelhardt. *Annalen der Physik,* v. 9, ser. 6, Oct. 15, 1951, p. 357-362.

Study of plastic deformation of Cu wire in the range of low shear stresses. Duration of spontaneous elongation is assumed to be functionally related to temperature. Data are graphed. (Q24, Cu)

160-Q. A New Aluminum Alloy of the Al-Cu-Si Type. (In German.) W. Thury and H. Landerl. *Berg und Hüttenmannische Monatshefte der Montanistischen Hochschule in Leoben,* v. 96, Oct. 1951, p. 201-205.

Study of strength properties and microstructure of eight Al alloys containing 1.32-2.43% Si and 1.47-2.39% Cu shows that they are suitable as cast alloys within certain limits and that their good properties and anodic oxidizability make them promising malleable alloys. Includes graphs, tables, and photomicrographs. 14 ref. (Q23, M27, Al)

161-Q. (Book) **The Hardness of Metals.** D. Tabor. Oxford University Press (Geoffrey Cumberleg), Amen House, Warwick Square, London E.C. 4, England.

Hardness measurements by spherical indenters, deformation and indentation of ideal plastic metals and of metals which work harden, the practical considerations of "shallowing" and elastic recovery, use of conical and pyramidal indenters, dy-

namic or rebound hardness, and area of contact between solids. Six appendices deal with Brinell, Meyer, and Vickers hardness measurements and their conversion factors, the connection between hardness and ultimate tensile strength, and typical hardness values. (Q29)

162-Q. (Book) **Theory of Perfectly Plastic Solids.** William Prager and Philip G. Hodge, Jr. 264 pages. 1951. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y.

A general introduction. Basic concepts, trusses and beams, torsion of cylindrical or prismatic bars, general theory of plane strain and extremum principles. Treatment is mathematical. Chapter problems. (Q23)

163-Q. Rolling Textures in Face-Centered Cubic Metals. Hsun Hu, P. R. Sperry, and Paul A. Beck. *Journal of Metals,* v. 4, Jan. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 76-81.

Quantitative pole figures were determined for both the internal texture and the surface texture of highly rolled 2S Al, tough-pitch Cu, and commercial 70-30 brass strips with two different rolling procedures: rolled in the same direction in successive passes, and rolled by reversing the strip end to end between successive passes. Results are diagrammed. 15 ref. (Q24, Al, Cu)

164-Q. A Preliminary Study of the Oxidation and Physical Properties of TiC-Base Cermets. Clinton C. McBride, Harold M. Greenhouse, and Thomas S. Shelvin. *Journal of the American Ceramic Society,* v. 35, Jan. 1, 1952, p. 28-32.

The TiC-base cermets investigated contained Cr, Fe, Co, Ni, NiAl, ferrosilicon, or duriron as the metallic constituent. They were evaluated on the basis of strengths at 75 and 1800° F., oxidation resistance at 2000° F., and degree of chemical reaction between carbide and metal as determined metallographically. Metallographic and X-ray studies were conducted on the oxide layers to determine a qualitative mechanism of oxidation. Results indicate TiC plus NiAl to be the most promising composition and oxygen diffusion to be the governing factor in the oxidation of the cermets studied. (Q23, R2, M27, Ti, C-n)

165-Q. Creep and Stress-to-Rupture Properties of Pressure Vessel Steels. R. D. Wylie and H. Thielsch. *Welding Journal,* v. 31, Jan. 1952, p. 11s-19s; disc. p. 19s-26s.

An interpretive engineering statement. Effect of fabrication processes on steels used in pressure vessels. Data are tabulated and graphed. 15 ref. (Q3, Q4, ST)

166-Q. Dimensional Effects in Fracture. C. W. MacGregor and N. Grossman. *Welding Journal,* v. 31, Jan. 1952, p. 20s-26s.

Influence of size on the transition temperature from ductile to brittle fracture, the effect of various ratios of combined stresses on the brittle transition temperature, and the effect of combined stresses on fracture strength. Material tested was Ryerson VD (0.95% C) toolsteel. Graphs and micrographs. 18 ref. (Q26, TS)

167-Q. Power Plant Piping. Hugh Welshman, Jr. *Heating, Piping & Air Conditioning,* v. 24, Jan. 1952, p. 135-142.

A detailed discussion of piping systems, design, manufacture, fabrication, installation and operation. Tabular data on mechanical properties and other specifications for ferrous metals and alloys used in various locations. (To be continued.) (Q general, S22, T25, CN, AY)

168-Q. Rare Earths Increase High Temperature Properties of Magnesium. K. Grube. *Iron Age,* v. 169, Jan. 17, 1952, p. 102-105.

Additions of Misch metal up to 2% increase the creep resistance of Mg extrusion alloys. Ni and Mn also improve high-temperature properties at 600° F. A fluosilicic acid treatment gives these Mg alloys good protection against oxidation up to 700° F. 3-in. billets extruded to ¾ in. were tested. Tabulated and illustrated data. (Q3, Mg, SG-h)

169-Q. Wearproofing Machine Elements. Paul B. Berlien. *Machine Design,* v. 24, Jan. 1952, p. 123-126.

Use of cemented carbides for wearproofing basic machine parts. Examples of this application as well as data on how the carbide is applied. (Q9, SG-m, C-n)

170-Q. Mechanical and Corrosion Tests of Spot-Welded Aluminum Alloys. Fred M. Reinhart, W. F. Hess, R. A. Wyant, F. F. Winsor, and R. R. Nash. *National Advisory Committee for Aeronautics,* Technical Note 2538, Dec. 1951, 74 pages.

Panels were fabricated from 24S-T3, Alclad 24S-T3, R-301-T6, XB75S-T6, and Alclad XB75S-T6, all of 0.040-in. thickness; and R-301-T6 of 0.020-in. thickness. Conditions of exposure and protective effect of adjacent cladding were such that the localized corrosion did not proceed to a point where it affected the shear strength of the welds. Data are tabulated. Micrographs. Q2, R general, K3, Al)

171-Q. Fundamental Effects of Cold-Work on Some Cobalt-Chromium-Nickel-Iron Base Creep-Resistant Alloys. D. N. Frey, J. W. Freeman, and A. E. White. *National Advisory Committee for Aeronautics,* Technical Note 2586, Jan. 1952, 12 pages.

The influence of cold working on the creep properties of an alloy containing 20% Co, 20% Cr, 20% Ni, and the balance Fe and on the same alloy modified by small additions of W alone or W, Mo, and Cb in combination was studied. Effects of cold working on creep resistance were similar for all the alloys studied. (Q3, AY)

172-Q. Creep Under Complex Stress Systems at High Temperatures. A. E. Johnson. *Aircraft Engineering,* v. 24, Jan. 1952, p. 6-16.

The materials studied were a cast 0.17% C steel, an Al alloy (R.R.59), a Mg alloy (containing 2% Al), and a Ni-Cr alloy (Nimonic 75). Each material was tested at temperatures within its normal working range. Data are tabulated and graphed. (Q3, CN, Al, Ni, Cr, Mg)

173-Q. Growth Twins in Cadmium. D. S. Oliver. *Research,* v. 5, Jan. 1952, p. 45-46.

Mechanism of formation. (Q24, Cd)

174-Q. Fatigue of Steels; Data on Fatigue and Their Application to Design. *Automobile Engineer,* v. 42, Jan. 1952, p. 35-40. (Based on "The Fatigue Strength of Steels", by R. J. Love.)

The nature of fatigue and the nature of presentation of data. Application of data such as S-N diagrams and Goodman diagrams to design. (Q7, ST)

175-Q. Use of Wire-Resistance Strain-Gauges in Automobile Engineering Research, With Particular Reference to the Measurement of Strain in Vehicle Structures. J. R. Bristow, P. Metcalf, and C. H. G. Mills. *Institution of Mechanical Engineers, Proceedings,* Automobile Div., pt. 2, 1950-51, p. 27-37; disc. p. 37-47.

Sphere of usefulness and limitations of wire resistance strain gages, and factors affecting accuracy and stability. Determination of static strain, using a simple bridge and galvanometer method. Dynamic strain determination with reference to measurements made on the frame and superstructure of a double-deck public service vehicle under road conditions; typical strain records. (Q25)

176-Q. Round-Up on Titanium. II. A Review of Mining Methods. *South African Mining and Engineering Journal,* v. 62, pt. 2, Dec. 29, 1951, p. 777-779.

Includes tabular data on mechanical and physical properties of Ti, Mg, Al, Fe, and Cu. (Q general, P general, Ti, Mg)

177-Q. Influence of Low-Temperature Heat Treatment on Creep Resistance. (In French.) Georges Delbart and Michel Ravery. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 233, Dec. 3, 1951, p. 1455-1457.

Long-time aging of a steel containing 0.12% C, 0.6% Cr, and 0.6% Mo was studied at 450 and 575° C., showing that it has a favorable influence on creep resistance of a series of phases: ferrite-pearlite; higher ferrite-bainite; ferrite-bainite-sorbite; two sorbites; and three lower bainites. (Q3, J27, AY)

178-Q. Strength of Contact Surfaces of Steel Spur Gears. (In German.) *Zeitschrift des Vereines Deutscher Ingenieure,* v. 93, Nov. 21, 1951, p. 1050-1053.

Test results, particularly influence of gear profile. Charts and diagrams. (Q23, T7, ST)

179-Q. The Effect of the Smoothness of the Working Surface on the Resistance to Rupture Caused by Single and Repeated Impact. (In Russian.) G. I. Pogodin-Alekseev and A. V. Pamfilov. *Stanki i Instrument,* v. 22, Apr. 1951, p. 22-23.

See abstract from *Engineer's Digest;* item 677-Q, 1951. (Q6, ST)

180-Q. Machine for Wear Testing Gage Materials. (In Russian.) A. L. Chestnov. *Stanki i Instrument,* v. 22, Apr. 1951, p. 23-25.

Machine is described, diagrammed, and illustrated. (Q9)

181-Q. Properties of Spinning Pins. (In Japanese.) Kunio Futaki. *Journal of Mechanical Laboratory,* v. 5, Sept. 1951, p. 217-220.

Refers to pins used in spinning machines. Present mechanical-test methods and their drawbacks. Suggests microbend test apparatus and procedure for this application. Diagram and graphs. (Q5, ST)

182-Q. The Micro Bending Test Machine. (In Japanese.) Kunio Futaki. *Journal of Mechanical Laboratory,* v. 5, Sept. 1951, p. 221-224.

Apparatus designed for testing of spinning-machine pins. Typical data are charted and tabulated. (Q5, ST)

183-Q. The Effect of Wear of the Several Metals Against Clay Particles. (In Japanese.) Tamaki Watanabe. *Journal of Mechanical Laboratory,* v. 5, Sept. 1951, p. 225-230.

Results of investigation for various ferrous and nonferrous metals and alloys, especially Ni, Fe, Cu, and Al. Tables and graphs. (Q9, Ni, Fe, Cu, Al)

184-Q. Vanadium Steels for Castings; Higher Tensile and Impact

Strengths. *Alloy Metals Review,* v. 8, Dec. 1951, p. 2-6.

Surveys these properties. Data are tabulated. (Q27, Q6, AY)

185-Q. Microhardness Testing. D. L. Paterson. *Canadian Metals,* v. 15, Jan. 1952, p. 46, 48, 50-51.

How case depths, weld boundary zones, and small components may all be accurately evaluated by means of microhardness tests. (Q29)

186-Q. Heat-Resisting Alloys for Use in Jet Engines. *Industrial Heating,* v. 19, Jan. 1952, p. 48, 50, 154.

Facilities at International Nickel research laboratory for conducting tests on alloys for high-temperature applications. Research includes creep and stress-rupture tests as well as heat treatment studies. (Q3, Q4, J general, SG-h)

187-Q. Steam Piping for High Pressures and High Temperatures. R. W. Bailey. *Institution of Mechanical Engineers, Proceedings,* v. 164, No. 3, 1951, p. 324-335; disc., p. 336-350.

Distribution of stress in pipes, the accompanying creep, and their application to the rational and economical design of steam piping; the determination of permissible working stress; differences in American and British procedures and consequent differences in stress magnitudes. Tentative considerations of behavior of ferritic and austenitic steels, and the action of creep at operating pressure and temperature in reducing and removing the initial thermal expansion loading of a pipeline, and in imposing it fully when cold. Deals with the problem of making a joint between ferritic and austenitic steel piping and components, and factors of materials and corrosion. (Q3, K general, R general, SS, SG-g, h)

188-Q. Conservation of Steel by Design. O. W. Irwin. *Journal of the American Concrete Institute,* v. 23, Jan. 1952; *ACI Proceedings,* v. 48, 1952, p 373-378.

Suggestions for saving steel in reinforced concrete design. Inconsistencies in steel stresses. Recommends that tensile unit stress be 60% of the minimum yield point. (Q27, ST)

189-Q. The Crystallographic Aspect of Slip in Body-Centered Cubic Single Crystals. II. Interpretation of Experiments. A. J. Opinsky and R. Smoluchowski. *Journal of Applied Physics,* v. 22, Dec. 1951, p. 1488-1492.

A new method for determining the ratios of critical shear stresses was applied to data taken from the literature and to original results. Measurements of yield strength were found to be not too satisfactory for the investigation of the slip behavior of body-centered cubic materials. On the other hand, any method which determined the slip plane and the orientation of the tensile axis gave useful results. Graphs and charts. (Q24)

190-Q. Deformation of Body-Centered Cubic Metals. E. A. Calnan, and C. J. B. Clews. *Journal of Applied Physics,* v. 22, Dec. 1951, p. 1508.

Discusses recent results of Opinsky and Smoluchowski. Operative slip systems for unequal and equal critical shear stresses are shown in diagrams. (Q24)

191-Q. Mechanism of Plastic Flow in Titanium. F. D. Rosi, C. A. Dube, and B. H. Alexander. *Journal of Metals,* v. 4, Feb. 1952, p. 145-146.

The plastic behavior of Ti was investigated at room temperature in deformed coarse-grained sheet specimens (grains 2-6 mm. in diam.), produced by a modification of the strain-anneal technique. Determination of slip and twinning planes was based on use of a stereographic plot of a back-reflection Laue photograph describing the region where slip and twinning were observed. (Q24, Ti)

192-Q. Embrittlement of High Chromium Ferritic Stainless Steels at 475° C. A. J. Lena and M. F. Hawkes. *Journal of Metals,* v. 4, Feb. 1952, p. 146.

These steels, when heated in or slowly cooled through the range 425-525° C., show a complete loss of ductility. This embrittlement was investigated by single-crystal X-ray methods, metallographically, and by changes in physical and mechanical properties. (Q23, SS)

193-Q. Deformation of Ferrite Single Crystals. F. L. Vogel, Jr., and R. M. Brick. *Journal of Metals,* v. 4, Feb. 1952, p. 147.

The mechanism and critical resolved shear stresses for deformation of ingot-iron single crystals were studied between −70 and +200° C. (Q24, Fe)

194-Q. Slip & Twinning in Single Crystals of Beryllium. H. T. Lee and R. M. Brick. *Journal of Metals,* v. 4, Feb. 1952, p. 147-148.

The critical resolved shear stress for basal slip in Be single crystals under compression was measured at different temperatures in the range from room temperature to 500° C. In these studies, the basal plane was 20-70° from the stress axis. (Q24, Be)

195-Q. Anelastic Studies of the Effects of Nitrogen in Molybdenum. R. Maringer and G. T. Muehlenkamp. *Journal of Metals,* v. 4, Feb. 1952, p. 149.

Internal-friction tests were made. Molybdenum wire, impregnated with N_2, is inserted as the suspension of a torsion pendulum and oscillated at low frequencies. A stable peak was observed in the internal friction vs. temperature curve at 1300° F. and a frequency of 1 cycle per sec. (Q22, Mo)

196-Q. Orientations in Annealed, Very Large-Grained Aluminum. R. G. Treuting and W. C. Ellis. *Journal of Metals*, v. 4, Feb. 1952, p. 150.

In 2S Al, annealed after rolling to 0.027 in. thickness, a very large and widely varying grain size was developed, with grains from less than ⅛ in. to over 2 in. across and an average area of 1 sq. in. (Q24, Al)

197-Q. Intercrystalline Failure of Metals at Elevated Temperatures. O. C. Shepard. *Journal of Metals*, v. 4, Feb. 1952, p. 151.

Stress-rupture tests were made on commercial metals in inert gases and air; and on pure gold in air and in vacuum. (Q4, Au)

198-Q. Effect of Cold Deformation and Annealing on Young's Modulus of Metals. M. E. Fine and N. T. Kenney. *Journal of Metals*, v. 4, Feb. 1952, p. 151-152.

Specimens of Al (2S), Cu (OFHC) and Fe (Armco and electrolytic) were studied. A dynamic method of measurement was used, the maximum strains being in the range of $1x10^{-7}$ to $1x10.^{-4}$. (Q21, Fe, Cu, Al)

199-Q. Cast Molybdenum of High Purity. G. W. P. Rengstorff and R. B. Fischer. *Journal of Metals*, v. 4, Feb. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 157-160.

A study was made of the effect of impurities on the bend ductility of cast molybdenum. High-purity Mo was prepared by remelting under high vacuum. The ductility of "transverse-grain" specimens indicated that intergranular brittleness decreased with an increase of purity of the metal. (Q23, Mo)

200-Q. Internal Friction Measurements on Iron Wires of Commercial Purity. Ake Josefsson and Eric Kula. *Journal of Metals*, v. 4, Feb. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 161-165.

The internal friction method of determining carbon and nitrogen in solid solution in α iron was applied to some steels of commercial purity. The presence of impurities, such as Mn and perhaps P, changed the position of the internal-friction curve for nitrogen and broadened it. Micrographs. (Q22, Fe)

201-Q. Tensile Properties of Wrought Austenitic Manganese Steel in the Temperature Range From +100° to −196° C. H. C. Doepken. *Journal of Metals*, v. 4, Feb. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 166-170.

Flow and fracture stresses, as well as conventional properties, were determined. Ductility and related properties, such as fracture stress, decreased continuously with temperature. Peculiarities during straining indicated possible martensite formation or mechanical twinning. 13 ref. (Q27, AY)

202-Q. Dislocation Collision and the Yield Point of Iron. A. N. Holden. *Journal of Metals*, v. 4, Feb. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 182-188.

Studies of the above extend the dislocation mechanism to account for localized cataclysmic flow by a dislocation-collision process and provide experimental evidence to support such a process. Only the yielding of iron containing carbon is discussed, although other metal-solute systems are known to behave similarly. 20 ref. (Q24, Q23, Fe)

203-Q. Delay Time for the Initiation of Slip in Metal Single Crystals. I. R. Kramer and R. Maddin. *Journal of Metals*, v. 4, Feb. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 197-203.

Single crystals of α-brass, aluminum, and β-brass were studied. A delay time for slip was found in β brass when the specimens were tested below room temperature; however, one was not found for α brass or Al. A general theory of the existence of the brittle transition temperature is proposed. 13 ref. (Q24, Cu, Al)

204-Q. How to Select Steels for Low Temperature Service. John L. Everhart. *Materials & Methods*, v. 35, Jan. 1952, p. 75-79.

Metallurgical and mechanical factors. Melting procedure, chemical composition, finishing temperature for hot rolling, internal structure, grain size, and heat treatment influence the temperature at which the steels become embrittled. Design of the part, presence or absence of notches, restraint, type of loading, size and shape influence the manner of failure. Extensive tabulated data give mechanical properties of various carbon and low-alloy steels at low temperatures, effect of sustained stress, and effect of melting practice on impact strength. 18 ref. (Q general, Q6, Q23, CN, AY)

205-Q. The Working of Metals. (Concluded). W. C. F. Hessenberg. *Metal Industry,* v. 80, Jan. 11, 1952, p. 23-25; Jan. 18, 1952, p. 50-53.

A study of the efficiency of metal deformation processes. Compares use of plasticine and calculated strain patterns. (Q25)

206-Q. Testing Today and Tomorrow. F. G. Tatnall. *Metal Progress,* v. 61, Jan. 1952, p. 64-67.

Follows the course of applications of electronics in testing equipment and tries to forecast how such devices may help attain future needs. Principal emphasis is on strain gages; creep, rupture, and fatigue testing; and nondestructive testing. (Q general, S general)

207-Q. Notch Toughness of Low-Alloy Steels. *Metal Progress,* v. 61, Jan. 1952, p. 156, 158, 160. (Condensed from "Notch-Toughness of Fully Hardened and Tempered Low-Alloy Steel," R. L. Rickett and J. M. Hodge.)

Previously abstracted from *American Society for Testing Materials,* Preprint 31, 1951. See item 335-Q, 1951. (Q6, AY)

208-Q. A Simplified Constant Shear Stress Lever for Creep Tests on Single Crystals. M. Metzger. *Review of Scientific Instruments,* v. 22, Dec. 1951, p. 1022-1023.

A theoretical analysis. Suitable apparatus is diagrammed. (Q3)

209-Q. Elastic Elongation of Chains. L. H. Whitney and P. M. MacDonald. *Product Engineering,* v. 23, Feb. 1952, p. 176-177.

Results of many tests extending over a considerable length of time have been compiled and developed into chart form. These charts are the summation of averages and limits computed for each individual chain size by statistical quality-control methods confined to steel roller, conveyor, and cable chains. (Q23, S12, ST)

210-Q. The Measurement of the Young's Modulus of Metals and Alloys by an Interferometric Method. II. The Influence of Heat Treatment on the Young's Moduli and Densities of Ni-Mn Alloys. (In English.) Tadao Fukuroi and Yoshio Shibuya. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 2, Dec. 1950, p. 829-836.

An investigation. Data are graphed and tabulated. (Q21, P10, Ni, Mn)

211-Q. The Effect of the Low-Temperature Annealing Upon the Fibrous Structures of Highly Cold Worked Copper. (In English.) Masayuki Kawasaki. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 2, Dec. 1950, p. 861-870.

The fibrous structures developed in Cu, cold drawn as highly as 80% or more, were investigated by X-ray analysis. The most outstanding result was that in the central portion of the wire, the fibrous character was made more evident than in the cold worked state due to annealing at 60° C. for 1 hr. after cold working. These changes are believed to be caused most probably by crystal hardening or strengthening resulting from such crystal reorientation. (Q24, M26, Cu)

212-Q. Nitrogen as the Alloying Element in Steels. I. On the Effect of Nitrogen on the Temper Brittleness in Steels. (In English.) Yunoshin Imai and Tetsuro Ishizaki. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 2, Dec. 1950, p. 890-908.

The effect of nitrogen was first examined with the impact test on carbon steels and on low-Mn steels, both containing different amounts of nitrogen. Al and Ti were studied as fixers of nitrogen. From these investigations it was clear that the temper brittleness decreases or almost disappears upon addition of these elements. Data are graphed and tabulated. (Q23, ST)

213-Q. Contribution to the Study of Foundry Brasses. (In French.) Marcel Cirou and Pierre-Julien Le Thomas. *Fonderie,* Dec. 1951, p. 2715-2728.

The influence of additions of P, Si, and Al on mechanical characteristics, structural factors, and castability of Cu-Zn alloys was studied on two types of brasses: one with a Cu content between 70 and 72%, and the other between 59 and 62%. Diagrams, tables, charts, and photomicrographs. (Q general, M27, E25, Cu)

214-Q. Use of the "Alufran" Model-Plate for Tensile-Test Specimens. (In French.) *Fonderie,* Dec. 1951, p. 2746-2747.

Casting procedure. Diagrams. (Q27, E25)

215-Q. Theories of Deformation of Polycrystals. (In French.) Pierre Laurent. *Métaux: Corrosion-Industries,* v. 26, Nov. 1951, p. 433-441.

Various theories concerning stress relief; working effects; homogeneous triaxial strains; influence of rate of deformation; and temperature, creep, and relaxation. Data of various investigators on a wide variety of ferrous and nonferrous metals are tabulated and charted. 17 ref. (Q24, Q25, Q3)

216-Q. New Possibilities in Radiographic Determination of Stresses With the Aid of Short-Wave-Length Radiation. (In French.) Hermann Möl-

ler. *Métaux: Corrosion-Industries,* v. 26, Nov. 1951, p. 460-469.

See abstract from *Archiv für das Eisenhüttenwesen;* item 302-Q, 1951. (Q25, ST)

217-Q. Is Mechanical Stress Relief Necessary for the Safety of Welded Pressure Vessels? (In French.) H. Gerbeaux. *Soudure et Techniques connexes.* v. 5, Nov.-Dec. 1951, p. 251-256.

Plastic deformation of the material under severe states of stress, stabilization of successive service cycles, and influence of residual stresses. Concludes that such treatment is usually unnecessary. Schematic diagrams. (Q25, G23, ST)

218-Q. Influence of Bearing Design Upon Load Carrying Capacity and Operational Safety of Bearings. (In German.) Alfred Buske. *Stahl und Eisen,* v. 71, Dec. 1951, p. 1420-1432; disc., p. 1432-1433.

Oil-film pressure and temperature were determined in bearing-test machines with bearings of different design characterized by variation in rigidity of the bearing body and the bushing. Effects of modulus of elasticity of the bearing materials. Diagrams, graphs, and illustrations. (Q23, SG-c)

219-Q. More Recent Development of the "Pasted-On" Electrical Resistance Pickup and Importance of the Wheatstone Circuit as a Measuring Method. (In German.) A. U. Huggenberger. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 17, Nov. 1951, p. 321-332.

Modifications of the American SR-4 strain gage, showing diagrams and photographs to illustrate principles and designs. Data are charted and tabulated. (Q25)

220-Q. Some Problems of Heat Resistant Steels From the Standpoint of the Consumer. (In German.) W. Stauffer. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 17, Dec. 1951, p. 353-364.

Problems that occur in the construction of steam and gas turbines. Test results for Cr-Mo steels (1% Cr and 1% Mo) and cast Mo steel, including data on creep resistance and on the effect of combustion gases and ash components on these steels. Nondestructive testing of steel castings. Graphs, tables, and photographs. (Q3, R7, T25, AY, SG-g, h)

221-Q. Theory of Dynamic Deformation. (In German.) F. Vitovec and H. Nowotny. *Zeitschrift für Physik,* v. 131, Dec. 1, 1951, p. 41-47.

Dependence of critical shear stresses on rate of deformation as computed by R. Becker's dynamic plasticity equation contradicts most test results. A new equation yields results which agree satisfactorily with most test results. Data are graphed. 17 ref. (Q2)

222-Q. Fatigue Strength of Metals: Notched Parts. (In Italian.) Mirko Ros. *Metallurgia Italiana,* v. 43, Dec. 1951, p. 512-520.

Results of experiments on various steels, pure Al, Al alloys, etc. Data are correlated showing relationship between fatigue limit and notch coefficient (maximum notch stress divided by mean notch stress.) Size and internal-stress effects are also shown. (Q7, ST, Al)

223-Q. Contribution to the Study of Hardness and Strength of Metals. (In Spanish.) Jose Terraza Martorell. *Técnica Metallurgia,* v. 7, Apr. 1951, p. 109-123.

Application of Meyer's law for the relationship between hardness and strength properties of metals was studied theoretically. Results are correlated with data collected from the literature for copper, α brass, aluminum and steel. Graphs, diagrams, and tables. 53 ref. (Q29, Q23, Cu, Al, ST)

224-Q. Brittle and Ductile Fractures; Micromechanism of the Rupture of Metals. (In Spanish.) Rafael Calvo Rodes. *Instituto del Hierro y del Acero,* v. 4, July-Sept. 1951, p. 209-219.

Intergranular and transcrystalline fractures, deformation and rupture of metals, brittleness, and micromechanism of brittle fracture are analyzed theoretically. Diagrams and charts. (To be continued.) (Q26)

225-Q. Elasticity and the Transition Zone of Steels. (In Spanish.) Luis Hurtado Acera. *Instituto del Hierro y del Acero,* v. 4, July-Sept. 1951, p. 220-226.

Factors affecting elasticity and transition temperature. Results of experiments on the relationship between values of elasticity, ductility, and tensile strength. Includes diagrams. (Q21, ST)

226-Q. Iron and Steel Structures. J. L. Beckel, chairman. *American Railway Engineering Association Bulletin,* v. 53, Jan. 1952, p. 507-609.

A committee report including design of expansion joints involving iron and steel structures; stress distribution in bridge frames; design of steel bridge details; preparation and painting of steel surfaces; use of high-strength structural bolts in steel railway bridges; and means of conserving labor and materials, including the adaptation of substitute noncritical materials; and specifications for reclamation of released materials, tools and equipment. (T26, ST)

227-Q. Review of the Fatigue of Materials Field. R. E. Peterson. *Applied Mechanics Reviews,* v. 5, Jan. 1952, p. 1-3.

51 references. (Q7)

228-Q. The Notch Toughness Test of Henri Schnadt. Wendell P. Roop. *ASTM Bulletin,* Jan. 1952, p. 61-64.

Material under compression is removed in such a way that fracture occurs in tension, which is only moderately eccentric. 10 ref. (Q23)

229-Q. Fatigue Tests Under Axial Loads of Aluminum Joints Bonded With a Resinous Adhesive. W. N. Findley, B. A. Century, and C. P. Hendrickson. *ASTM Bulletin,* Jan. 1952, p. 67-71, disc., p. 71.

Single-lap, double-lap, and butt joints were tested in an axial-load fatigue machine. Methods of testing, merits of the three procedures employed, and test results obtained. The fatigue strength at 107 cycles was found to be about three times as large for the butt joints as for the lap joints. Differences in state of combined stress may account for some of the observed differences in test results. (Q7, A1)

230-Q. Pneumatic Fatigue Tester for Metals. *Compressed Air Magazine,* v. 57, Feb. 1952, p. 50.

Developed by General Electric Co. (Q7)

231-Q. Substitutes for Scarce Materials in Spring Design. Frank A. Votta, Jr. *Electrical Manufacturing,* v. 49, Feb. 1952, p. 116-119, 268, 270.

Characteristics of various materials which can be used as substitutes for Type 302 stainless steel and phosphor bronze. Includes mechanical properties. (T7, Q general, SG-b)

232-Q. Shortcomings of Structural Analysis. J. F. Baker. *Engineering,* v. 173, Jan. 11, 1952, p. 57-59; Jan. 18, 1952, p. 92-93.

A detailed discussion including tests made on bars of rolled mild steel. (Q25, CN)

233-Q. Creep-Test Research Station. *Engineering,* v. 173, Jan. 25, 1952, p. 107-108; *Engineer,* v. 193, Jan. 25, 1952, p. 136-137.

Station erected by Imperial Chemical Industries, Ltd., for the study of creep in metals. (Q3)

234-Q. Uses of Ductile Iron Are Increasing. *Industry and Power,* v. 62, Feb. 1952, p. 109-110.

Properties and applications of ductile iron and comparison with malleable iron and cast carbon steel. (Q general, T general, CI)

235-Q. Tin and Copper in Steel: Both Are Bad; Together They're Worse. S. L. Gertsman and H. P. Tardif. *Iron Age,* v. 169, Feb. 14, 1952, p. 136-140.

How tin build-up caused cracks in bend tests at 1825° F. and during hot forming. An argon atmosphere prevents this—except when Sn content is increased. Treatment at 2300° F. also reduces cracking. Deeper surface breaks develop as Cu is increased at a given Sn level and as Sn is increased at a given Cu level. Tables, graphs and micrographs. (Q5, ST)

236-Q. New Method of Determining Endurance Limit of Steel and Other Materials. *Machinery* (American), v. 58, Feb. 1952, p. 153.

Dilastrain method developed at Rensselaer Polytechnic Institute is based on precise measurements of the extent to which specimens of a given material will expand under controlled temperatures. The apparatus is applicable to metals, alloys, or plastics. (Q7)

237-Q. Hard Metal for Wear Resistance. *Machinery Lloyd,* (Overseas Edition), v. 24, Jan. 9, 1952, p. 87-88.

A few of the applications where tungsten carbides have been particularly successful. (Q9, T general, W, C-n)

238-Q. A New Version of "Strength of Materials." Archibald C. Vivian. *Metallurgia,* v. 45, Jan. 1952, p. 29-37.

A new theory based on effects of atomic or lattice changes under metallurgical treatments. The author is extremely critical of generally accepted theories. (Q23, M25, M26)

239-Q. Direct-Reading Design Charts for 75S-T6 Aluminum-Alloy Flat Compression Panels Having Longitudinal Extruded Z-Section Stiffeners. William A. Hickman and Norris F. Dow. *National Advisory Committee for Aeronautics,* Technical Note 2435, Feb. 1952, 60 pages.

The charts cover a wide range of proportions, and make possible direct determination of stress and panel dimensions required to carry a given intensity of loading with a given skin thickness and effective length of panel. (Q25, A1)

240-Q. Fundamental Effects of Cold-Work on Some Cobalt-Chromium-Nickel-Iron Base Creep-Resistant Alloys. D. N. Frey, J. W. Freeman, and A. E. White. *National Advisory Committee for Aeronautics,* Technical Note 2586, Jan. 1952, 12 pages.

The influence of cold working on the creep properties of an alloy containing 20% Co, 20% Cr, 20% Ni and balance Fe; and on the same alloy modified by small additions of W alone or W, Mo, and Cb in combination was studied. Effects were similar for all the alloys studied. Data are graphed. (Q3, Co, Cr, Ni, Fe)

241-Q. Electronic Hammer Forces Metal to Change. *Steel,* v. 130, Feb. 18, 1952, p. 100.

Previously abstracted from "Statitron Will Workharden Aluminum Alloys, Build Forces to Cause Failure, Harden Non-Heat-Treatable Metals, Alter Physical Properties of Metals Instantly", Frank Charity, *American Machinist;* item 305-Q, 1951. (Q25, S13, J general)

242-Q. The Creep and Stress-Rupture Testing of Steam-Boiler Materials. J. B. Romer, and H. D. Newell. *Transactions of the American Society of Mechanical Engineers,* v. 74, Feb. 1952, p. 157-172; disc., p. 172-174.

Significance of the time factor in testing in relationship to long-life, steam-generating equipment. General effects of metal oxidation from steam and combustion atmospheres. Relative merits of long-time creep tests and stress-rupture tests, and typical test data for each form of test. Suggestions for temperature limits for superheater-tube materials and a resume of field experience on carbon and alloy steels. 32 ref. (Q3, Q4, R2, CN, AY)

243-Q. It's Steel for Shock Resistance. Earl Obringer and R. C. Montanus. *Welding Engineer,* v. 37, Feb. 1952, p. 27-29, 42.

New design of lathe for shipboard use replaces the major cast-iron components with weldments so as to withstand stresses that include deck weaving and the impact of near misses in bombing. (Q25, K general, T5, ST)

244-Q. Fatigue Strength of Panels With Welded Angle Stiffeners. R. Weck. *Welding Research,* v. 5, Oct. 1951, p. 219r-249r.

A report of an investigation to determine the life of different types of welded joints in angle stiffeners attached to plates, when subjected to many repetitions of loading. Micrographs and diagrams. (Q7, K9, ST)

245-Q. (Pamphlet) **Tabla de Tipificacion de los aceros comunes.** (Table of Characteristics of Common Steels.) (In Spanish.) Instituto del Hierro y del Acero, 15 Villanueva, Madrid, Spain. Dec. 1950, 14 pages.

Table is grouped into three parts: bessemer steels, openhearth steels, and steels for particular uses. Compositions, mechanical properties, and applications are listed. (Q general, CN)

246-Q. Thermal Shock Tests on Gas Turbine Materials. M. Bentele and C. S. Lowthian. *Aircraft Engineering,* v. 24, Feb. 1952, p. 32-38.

Effects of severe temperature fluctuations on rotor blades and nozzle segments. Two forms of thermal shock tests are proposed. Materials include high-temperature alloys, ferritic high-temperature steel, copper, and porcelain. 12 ref. (Q23, AY, SS, Cu)

247-Q. New Heat-Resistant Alloy Is Developed. *Inco Magazine,* v. 25, Winter 1951-52, p. 13-14.

Incoloy—an alloy developed for resistance to high temperature and corrosion. Tabulated tensile properties. (Q general, R general, Ni, SG-g, h)

248-Q. Lower Alloys Developed For High-Temperature Use. C. L. Clark. *Iron Age,* v. 169, Feb. 21, 1952, p. 98-102.

Low-alloy steels modified for use at 1100° F. Development programs and results obtained. Mechanical properties of the various types. Tabular data. (Q general, AY, SG-h)

249-Q. Effect of a Copper Surface Film on Twinning in Zinc Mono-Crystals. John J. Gilman. *Nature,* v. 169, Jan. 26, 1952, p. 149-150.

Results of an investigation show that an electrodeposited film of Cu markedly increased the critical stress required to cause twinning of monocrystals. The effect does not seem to be caused simply by the mechanical strength of the copper. Data are tabulated. (Q24, Zn, Cu)

250-Q. Thermal Dependence of Elastic Constants of Electrodeposited Chromium. H. Pursey. *Nature,* v. 169, Jan. 26, 1952, p. 150.

Measurements of Young's modulus and modulus of rigidity were made at frequencies between 15 and 160 kc. per sec. over the range 10-80° C. on a tube of electroformed Cr which had been annealed for 15 hr. at 544° C. by a resonance method using magnetostrictive exciters and receivers. Data are graphed. (Q21, Cr)

251-Q. Hard Facing for Impact. Howard S. Avery. *Welding Journal,* v. 31, Feb. 1952, p. 116-143; disc. p. 143-145.

Static and dynamic compression testing data for important hard facing alloys; importance of engineering to avoid tension. Critical limitations of impact energy and velocity to minimize structural damage and to help in alloy selection. Hard facing alloy types are steels, carbides, alloy irons, and nonferrous-base alloys. A few representative applications; advantage of composite structures in wear control. (Q6, Q28, L24, SG-m)

252-Q. Stress Studies of Bulkhead Intersections for Welded Tankers. Wm. R. Campbell, L. K. Irwin, and R. C. Duncan. *Welding Journal,* v. 31,

Feb. 1952, p. 68s-75s; disc. p. 75s-77s.

The elastic stress distribution at room temperature, strain distribution prior to failure at 0° F., and energy for failure at 0° F. Stress values in the region of the intersection are compared with stresses in the longitudinal bulkhead bordering the intersection. Stress concentrations and energy at failure for the different specimens are also compared. (Q25, K general, ST)

253-Q. Fracturing and Fracture Dynamics. G. R. Irwin and J. A. Kies. *Welding Journal,* v. 31, Feb. 1952, p. 95s-100s.

A descriptive review. A direct application of energy-balance principles for calculating conditions for development of rapid fracturing. Photomicrographs illustrate fractures in ferrous and nonferrous metals. (Q26)

254-Q. Fatigue Tests of Arc Welded Joints. H. de Leiris and H. Dutilleul. *Welding Journal,* v. 31, Feb. 1952, p. 104s. (Translated and condensed from "Study of Fatigue in Welded Assemblies," H. DeLeiris, and "Testing Fatigue in Electric Arc Welded Joints," H. Dutilleul.)

Previously abstracted from *Soudure et Techniques Connexes,* See items 416-Q and 517-Q, 1951. (Q7, K9)

255-Q. Plans for Switches, Frogs, Crossings, Spring, and Slip Switches. M. J. Zeeman, chairman. *American Railway Engineering Association Bulletin,* v. 53, Feb. 1952, p. 772-774.

Plans to provide improved track support at the approaches to open-deck bridges and trestles. Minimum requirements for tensile properties of bolts and nuts. (Q27, T23, CN)

256-Q. Service Tests of Solid and Manganese Insert Crossings Supported by Steel T-Beams and Longitudinal Timbers. M. J. Zeeman, chairman. *American Railway Engineering Association Bulletin,* v. 53, Feb. 1952, p. 776-778.

Results of service tests on installations of 1946, and May 1949. (S21, Q9, T23, AY, CN)

257-Q. Service Tests on Various Types of Joint Bars. T. A. Blair, chairman. *American Railway Engineering Association Bulletin,* v. 53, Feb. 1952, p. 868-876.

Field work, analysis of data, and report of the measurements. (S21, Q9, CN)

258-Q. Causes of Shelly Spots and Head Checks in Rail: Methods for Their Prevention. L. S. Crain, chairman. *American Railway Engineering Association Bulletin,* v. 53, Feb. 1952, p. 899-920.

Compares performance of heat treated and control-cooled rails, and service tests of heat treated rail on the C. & O., Penna., N. & W., and Great Northern Railways. Includes appendices. "Tenth Progress Report of the Shelly Rail Studies at the University of Illinois," and "Summary of Progress on Investigation of Steel Relaxation in Rail Steel," separately abstracted. (S21, T23, ST)

259-Q. Tenth Progress Report of the Shelly Rail Studies at the University of Illinois. R. E. Cramer. *American Railway Engineering Association Bulletin,* v. 53, Feb. 1952, p. 902-915.

Results of mechanical and cradle rolling-load tests on rail specimens of C, Mn, Si, Cr, Ni, and V alloy steels. Photomicrographs. (S21, Q9, ST)

260-Q. Recent Developments Affecting Rail Section. W. J. Cruse, chairman. *American Railway Engineering Association Bulletin,* v. 53, Feb. 1952, p. 920-940.

Measurement of stresses in 115-RE and 132-RE rail in curved track, stresses developed around the bolt hole of a rail with the joint in tension, redesign of 100-RE rail and joint bars, and rail-web bolt-hole finish effects on fatigue failure. (Q25, Q7, CN)

261-Q. Extent of Strain of Primary Glide Planes in Extended Single Crystalline Alpha Brass. R. Maddin. *Journal of Metals,* v. 4, Mar. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 270.

Shows that strain distribution originates in the incongruent nature of the slip process. Use of a two-stage rotation process seems valid in attempting to explain the relation betwen the orientation of recrystallized grains and the matrix from which they have grown. (Q24, Cu)

262-Q. Preferred Orientation of Arc-Cast Molybdenum Sheet. M. Semchyshen and G. A. Timmons. *Journal of Metals,* v. 4, Mar. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 279-286.

Mechanical properties were measured at varying angles to the rolling direction to determine the effect of preferred orientation on anisotropy in Mo sheet which had been straight, cross, or compression rolled. Includes photomicrographs, graphs. and tabular data. 15 ref. (Q24, F23, Mo)

263-Q. Properties of Magnesium-Thorium and Magnesium-Thorium-Cerium Alloys. T. E. Leontis. *Journal of Metals,* v. 4, Mar. 1952; *Transactions*

of the American Institute of Mining and Metallurgical Engineers, v. 194, 1952, p. 287-294.

Results of a systematic study of the effects of compositional variation on tensile properties, creep resistance, conductivity, density, and metallography of Mg-Th alloys containing up to 50% Th both in the sand-cast and in the extruded states. The effect of addition of Ce to Mg-Th alloys is also reported. Photomicrographs and tabular data. (Q general, P general, M27, Mg)

264-Q. A Bridge Circuit for Wire Resistance Strain Gauges. B. V. Hamon. *Journal of Scientific Instruments,* v. 29, Feb. 1952, p. 53-54.

A strain-gage bridge circuit in which Waidner-Wolff adjustable resistance elements are used in the measuring arm. This type of element has some advantages over the more usual slide-wire measuring element where both wide range and a high accuracy are required. (Q25)

265-Q. A High-Strength Die Steel That Can Be Cold Hobbed. G. E. Brumbach. *Machinery* (London), v. 80, Feb. 14, 1952, p. 267-272.

See abstract from *Machinery* (American) item 770-Q, 1951. (Q29, Q9, T5, AY)

266-Q. Plastic Deformation of Magnesium Single Crystals. E. C. Burke and W. R. Hibbard, Jr. *Journal of Metals,* v. 4, Mar. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 295-303.

Studied by tensile tests at room temperature, utilizing an improved preparation and testing technique. Consistent critical resolved shear-stress values for basal slip were obtained. The advent of pyramidal slip at room temperature was rationalized upon the basis of grip constraints. A bend-twinning hypothesis is advanced as an explanation of mechanical twinning which occurs as a complex stress-relief mechanism. 26 ref. (Q24, Mg)

267-Q. Challenges Statement About Aluminum Bearings. P. G. Forrester. *Metal Progress,* v. 62, Feb. 1952, p. 79-80.

Refers to "Improved Aluminum Bearings (Al-Sn and Al-Sn-Cu Alloys)", H. K. Hardy, E. A. G. Liddiard, J. Y. Higgs, and J. W. Cuthbertson, *Metal Progress,* Oct. 1951 (see item 565-E, 1951). Points out that Cu-Pb alloys with Pb contents of 25-40% have similar properties to the Al-Sn Alloys. (Q general, M27, Pb, Cu, Al, SG-c)

268-Q. Deformation Pattern. J. J. Buczynski and N. J. Finsterwalder. *Metal Progress,* v. 62, Feb. 1952, p. 83.

How the ends of 0.068-in. o.d. by 0.026-in. i.d. capillary tubes illustrate dislocations, slip lines and twins. (Q24)

269-Q. Dilastrain Method for Determining Endurance Limit of Materials. Joseph L. Rosenholtz and Dudley T. Smith. *Metal Progress,* v 62, Feb. 1952, p. 85-88.

The principle of the method is that the coefficient of linear thermal expansion of materials decreases abruptly at the true endurance limit. Results with ferrous and nonferrous alloys. (Q7)

270-Q. Basic Stages of Deformation. *Metal Progress,* v. 62, Feb. 1952, p. 98, 100, 102. (Condensed from "Three Basic Stages in the Mechanism of Deformation of Metals at Different Temperatures and Strain-Rates", W. A. Wood, G. R. Wilms, and W. A Rachinger.)

Previously abstracted from *Journal of the Institute of Metals.* See item 327-Q, 1951. (Q24)

271-Q. Zr and Ti Substitutions for Manganese in Steel. *Metal Progress,* v. 62, Feb. 1952, p. 162, 164. (Condensed from "Behavior of Zirconium and Titanium in Steels With Particular Emphasis on the Conservation of Manganese", William W. Austin, Jr.)

See abstract of "Titanium and Zirconium—Emergency Substitutes for Manganese", *Steel;* item 745-Q, 1951. (Q23, Q6, Ti, Zr, AY)

272-Q. Equal-Strength Design of Tension-Field Webs and Uprights. Ralph H. Upson, George M. Phelps, and Tung-Sheng Liu. *National Advisory Committee for Aeronautics,* Technical Note 2548, Jan. 1952, 46 pages.

A method for proportioning thin-web beams to attain equal strength of web and uprights which may in turn be employed toward optimum design of these components. Improved empirical formulas for this purpose are developed and the results checked by experimental loading of six-beams. The empirical formulas developed are subject to the limitations of the imposed conditions of this investigation and proportions of uprights as brought out in the experimental results and conclusions. Test specimens were constructed of Al alloy. Graphs and tables. (Q23, Al)

273-Q. A Study of Poisson's Ratio in the Yield Region. George Gerard and Sorrel Wildhorn. *National Advisory Committee for Aeronautics,* Technical Note 2561, Jan. 1952, 30 pages.

Poisson's ratio for the Al alloys 14S-T6, 24S-T4, and 75S-T6. The test data are for simple tensile or com-

pressive loading along three orthogonal axes. Data are graphed. (Q21, Al)

274-Q. Internal Friction in Iron and Steel. J. D. Fast and L. J. Dijkstra. *Philips Technical Review,* v. 13, Dec. 1951, p. 172-179.

Damping experiments, at different temperatures, with a torsion-wire pendulum made of iron or steel containing a little C or N in solution (with or without the admixture of Mn), throw some light upon the extent to which the dissolved atoms precipitate after quenching of the metal. How the internal friction resulting from the solute atoms jumping from one interstice in the crystal lattice to another causes the amplitude of the torsional oscillations to decay exponentially. Results of the damping experiments make it possible to give a new explanation of the mysterious phenomenon of "magnetic aging". (Q22, Q8, N7, Fe, ST)

275-Q. General Theory of Small Elastic Deformations Superposed on Finite Elastic Deformations. A. E. Green, R. S. Rivlin, and R. T. Shield. *Proceedings of the Royal Society,* ser. A, v. 211, Feb. 7, 1952, p. 128-154.

A theoretical and mathematical analysis, especially for the case when the finite deformation is purely homogeneous. (Q21)

276-Q. I.C.I.'s Creep Test Research Station. Eustace C. Larke. *Times Review of Industry,* v. 6, Feb. 1952, p. 27-28, 30.

Work conducted by the Imperial Chemical Industries. Form and significance of the information obtained. (Q3)

277-Q. The Cause of "Training" in Fatigue Stress. (In German.) F. Vitovec. *Berg-und Hüttenmännische Monatshefte dér Montanistischen Hochschule in Leoben,* v. 97, Jan. 1952, p. 3-5.

Observed phenomenon of increasing fatigue strength by removing a thin layer of material from the surface of stressed material is explained on the basis of reduction of the notch effect because of reduction in the number of submicroscopic cracks in the surface. Includes graphs and diagrams. (Q7)

278-Q. Grain Refining of Steels by Hot Working. (In German.) Richard Werner. *Berg-und Hüttenmännische Montashefte der Montanistischen Hochschule in Leoben,* v. 97, Jan. 1952, p. 15-17.

A series of experiments on the various factors that determine the grain structure of hot worked steels. An empirical formula for estimation of grain-size reduction. (Q24, ST)

279-Q. Phenomenological Theories of Creep. A. Graham. *Engineer,* v. 193, Feb. 8, 1952, p. 198-201; Feb. 15, 1952, p. 234-236.

A formula with four adjustable constants relating permanent strain to stress, time, and temperature, is shown to represent successfully the decelerating stage of uniaxial creep in several dissimilar metals. Applications to tertiary creep, the tensile test, and stress relaxation. Data are compared for Nimonic 80, G-18-B, Stellite 8, Hiduminium RR-59, OFHC Cu, and high-purity Pb. 48 ref. (Q3, Cu, Pb, Ni, Co)

280-Q. Ship Research. S. Livingston Smith. *Engineering,* v. 173, Jan. 25, 1952, p. 105-106; Feb. 1, 1952, p. 156-160; Feb. 8, 1952, p. 185-187.

An investigation of stresses and deflections in mild steel ship plates. Stresses due to welding were studied. Vibration characteristics; design of propellers and boilers. (Q25, K9, CN)

281-Q. On the Empirical Law of Adhesive Wear. J. T. Burwell and C. D. Strang. *Journal of Applied Physics,* v. 23, Jan. 1952, p. 18-28.

Measurements were made of the wear of rubbing steel surfaces as a function of load, distance of travel, and hardness under controlled conditions which eliminated the effects of all factors except adhesion. Results are discussed in the light of the current adhesion theory of dry friction. (Q9, SG-m, ST)

282-Q. Investigation of Stress-Strain Relations of Metal Wires by Electrical Resistance Changes. Irwin Vigness. *Journal of Applied Physics,* v. 23, Jan. 1952, p. 43-47.

A method by which the stress-strain curve of a wire tensile specimen can be derived from measurements of its changes of electrical resistance as a function of strain. Examples illustrate the linear resistance-strain relations and applications of the method for several suitable materials. The resistance-strain characteristics of several materials that are not suitable. A statement of some mechanisms responsible. (Q27, P15)

283-Q. Bend and Vibratory Stress in Winding Ropes. Richard Saxton. *Mining Journal,* v. 238, Feb. 15, 1952, p. 170-171.

Construction, groove wear, and vibratory stress. Cast iron sheaves or drums are satisfactory where the pressure does not exceed 450 psi., and those made of cast steel for pressures between 800-900 psi., while Mn steel easily withstands pressures up to 2000 psi. Mn steel is recom-

mended particularly for sheaves. (Q5, Q25, T7, AY)

284-Q. Creep in Metals. A. D. Schwope, F. R. Shober, and L. R. Jackson. *National Advisory Committee for Aeronautics,* Technical Note 2618, Feb. 1952, 52 pages.

Results of a study of creep in single crystals of high-purity aluminum. At low stresses, the creep phenomenon appears to be consistent with Mott and Nabarro's theory of exhaustion creep, while at higher stresses, results appear to be more in accord with ideas expressed by Andrade. Graphs and tables. 25 ref. (Q3, Al)

285-Q. Fatigue Strengths of Aircraft Materials. Axial-Load Fatigue Tests on Notched Sheet Specimens of 24S-T3 and 75S-T6 Aluminum Alloys and of SAE 4130 Steel With Stress-Concentration Factor of 1.5. H. J. Grover, W. S. Hyler, and L. R. Jackson. *National Advisory Committee for Aeronautics,* Technical Note 2639, Feb. 1952, 22 pages.

(Q7, ST, Al)

286-Q. Plastic Deformation and the Meyer Constants of Metals. M. A. Meyer and K. J. Blok Van Laer. *Nature,* v. 169, Feb. 9, 1952, p. 237-238.

Results of experiments on well-annealed samples of Sn, Zn, and Cd. (Q24, Sn, Zn, Cd)

287-Q. Grain Movements During Creep. R. C. Gifkins. *Nature,* v. 169, Feb. 9, 1952, p. 238-239.

An investigation of the creep properties of a range of solid-solution alloys of Tl in Pb; and of their mode of deformation. (Q3, Tl, Pb)

288-Q. The Production of Large Tensile Stresses by Dislocations. J. S. Koehler. *Physical Review,* ser. 2, v. 85, Feb. 1, 1952, p. 480-481.

An edge-type dislocation has large tensile stresses associated with it. Maximum tensile stress is calculated. (Q25, M26)

289-Q. Selecting Hard Facing Materials to Resist Impact, Heat, Friction, Abrasion. Howard S. Avery. *Product Engineering,* v. 23, Mar. 1952, p. 154-159.

Classifies hard-facing alloys by composition. A graded series of wear resistant alloys. Data on mechanical properties. Covers irons, steels, various alloys, and tungsten carbide composites.
(Q9, Q6, SG-m, Fe, ST, W C-n)

290-Q. Torsional Fatigue Failures. J. O. Almen. *Product Engineering,* v. 23, Mar. 1952, p. 168-170.

Analytical studies of fatigue fractures in alloy steel torsion-bar springs for military vehicles, in spite of inherent planes of weakness, show that torsional fatigue failures are caused by, and develop normal to, the tensile component of the applied stress. Characteristics of torsional failures obtained from fatigue tests of torsion bars which were subjected to experimental variations in processing. (Q7, Q1, AY)

291-Q. Steel Brittleness Studied. *Steel,* v. 130, Mar. 10, 1952, p. 146, 148.

Results of NBS tests on carbon steels containing 0.9 or 1.6% Mn, 0.2-0.3% Si, and variable N_2. Results showed that N_2 is beneficial to low-temperature notch toughness if present as aluminum nitride but detrimental if in other nitride forms. (Q23, CN)

292-Q. Some Aspects of Research on Friction and Wear. F. T. Barwell. *Transactions of the Institution of Engineers & Shipbuilders in Scotland,* v. 95, pt. 2, 1951-52, p. 64-91; disc., p. 91-100.

Mechanical, physical, and chemical means for examining surfaces. The problem of fretting corrosion, the advantages of artificial protective films on surfaces, and the design of bearings. Experiments illustrated the existence of vortices at high speeds. Measurements on thrust bearings operating at 5000 r.p.m. Problems involved in the operation of ball and roller bearings at high speeds. (Q9, R1, SG-c)

293-Q. Some Recent Developments in Semihard Steels for Welded Construction. (In French.) C. Fornaci. *L'Ossature Métallique,* v. 16, Dec. 1951, p. 603-607.

Two kinds of steel, one with a small content of Mn-Cr, the other with a small content of Mn-Cr-Cu, and their use in the production of high-pressure tubing. Mechanical properties and weldability. Micrographs, charts, and photographs.
(Q general, K9, AY)

294-Q. Creep. (In French.) Maurice de Courcel. *Metallurgie et la Construction Mécanique,* v. 83, Nov. 1951, p. 847-849, 851-852.

Brief outline of the phenomenon of creep in monocrystalline and polycrystalline metals, giving results of tests on pieces susceptible to creep. Micrographs, diagrams, and photographs. (Q3)

295-Q. Microhardness and Its Metallurgical Applications. (In French.) H. Buckle. *Révue de Métallurgie,* Dec. 1951, p. 957-965; disc., p. 965.

Different kinds of microhardness testers and the special laws of microhardness. Diagrams, photographs, charts, and micrographs. 47 ref. (Q29)

296-Q. Internal Stresses in Continuous Aluminum Casting. (In German.) A. Roth. *Giesserei,* v. 38, Dec. 27, 1951, p. 667-668.

Discussion concerning a previous article by G. Seeger. (See item 526-Q, 1951). Includes author's reply. (Q25, C5, Al)

297-Q. X-Ray Microstructure Investigations of the Creep of Steel. (In German.) W. Epprecht. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 18, Jan. 1952, p. 10-21.

X-ray studies were made to investigate changes of austenite crystals in the range 570-750° C. Results show that creep, manifested by slip of austenite crystals, has a strain hardening effect. The experiments were made with variation of temperature, load, and time. Includes tables and X-ray diagrams. 26 ref. (Q3, ST)

298-Q. Mechanical Aging (Strain Aging) of Hard-Drawn Patented Steel Wire. (In German.) Fritz Schweir. *Stahl und Eisen,* v. 72, Jan. 17, 1952, p. 58-66.

Results of aging experiments on wires of different carbon content and diameter. Variations of mechanical properties are extensively tabulated and charted. 13 ref. (Q general, G23, N7, CN)

299-Q. Effect of Surface Condition on Fatigue Bending Strength. (In German.) Paul Gimmel. *Werkstoffe und Korrosion,* v. 2, Dec. 1951, p. 461-462.

Discrepancies in published fatigue test results are shown to be largely due to different surface conditions. Fatigue test results were found to be influenced by methods and time of polishing the test specimens. Results for two steels and Armco iron. Photomicrographs, graphs, and tables. (Q7, ST)

300-Q. Present Status of the Quality Requirements for Copper Wire in the Electrical Industries. (In German.) Rudolf Reinbach. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 5, Jan. 1952, p. 9-14.

The basic causes of substandard Cu wires with respect to conductivity, workability, and surface quality. Graphs, photographs, and tables. (Q general, P15, Cu)

301-Q. Displacement Structures in Cubic Face-Centered Crystals. II. (In German.) Horst-Dietrich Dietze, *Zeitschrift für Physik,* v. 131, No. 2, 1952, p. 156-169.

Derivation of Peierl's equation is improved. Points of attack of the forces in the slip plane are clarified; hence the atomic structure of the slip plane in Peierl's equation is retained. Data are graphed and tabulated. (Q24)

302-Q. Investigation of the Mechanical Properties of Welded Joints in Circular Specimens. (In Russian.) A. S. Fal'kevich and I. E. Neifel'd. *Avtogennoe Delo,* v. 22, May 1951, p. 18-20.

Tests were made on circular specimens cut from welded carbon steel tubes and similar articles. The test method and results, compared with data from standard specimens. Data are tabulated and charted. (Q general, K9, CN)

303-Q. Thermodynamic Criteria of Resistance to Plastic Deformation of Saturated Solid Solutions of Metals. (In Russian.) K. A. Osipov and B. P. Stoiukhin. *Doklady Akademii Nauk SSSR,* new ser., v. 80, Oct. 1, 1951, p. 627-630.

Criteria are developed in conformance with Le Chatelier's law and well-known experimental data. Results are charted. (Q24, P12)

304-Q. (Book) Studies in Large Plastic Flow and Fracture. P. W. Bridgman. McGraw Hill Book Co., 330 West 42nd St., New York 18, N. Y. $8.00.

Collects, into a coordinated whole, the results of original experiments by the author on fracture and plastic flow. The author's life-long experimental work has been in the field of high pressures, in which he has pushed the range of pressures, experimentally controllable in the laboratory, from 3000 to 100,000 kg. per sq. cm. In this pressure range, extensive investigations were made of the properties of matter. (Q24, Q26)

305-Q. Notch Sensitivity At High Temperatures Evaluated. W. F. Brown, Jr. and George Sachs. *Iron Age,* v. 169, Mar. 20, 1952, p. 91-95.

See abstract of "A Critical Review of Notch Sensitivity in Stress-Rupture Tests," National Advisory Committee for Aeronautics, Technical Note 2433; item 555-Q, 1951. (Q23, AY, SG-h)

306-Q. The Experimental Approach to Aircraft Structural Research; the Fifteenth Wright Brothers Lecture. P. B. Walker. *Journal of the Aeronautical Sciences,* v. 19, Mar. 1952, p. 145-160; disc., p. 161-172.

Recent work done in Great Britain and particularly at the Royal Aircraft Establishment. Testing of small specimens made of Xylonite. Strength testing of actual aircraft opens up several fields of research activity. Design studies of new testing equipment for large aircraft and for pressurized cabins. Measurement of external forces in flight and the design of measuring instruments. Structural fatigue. (Q25, Q7)

307-Q. Strength of Alloy Cast Irons. H. A. Altorfer. *Machine Design,* v. 24, Mar. 1952, p. 162-164. (A condensation.)

An analysis of the limitations of cast steel and cast iron based on experimental results for cylindrical vessels. (Q23, CI)

308-Q. Inelastic Strains in Steel Beams. H. T. Corten, M. E. Clark, and O. M. Sidebottom. *Machine Design,* v. 24, Mar. 1952, p. 228, 230, 232. (A condensation.)

Experimental results. (Q23, ST)

309-Q. The Theory of Plastic Flow in Single Crystals. Frederick Seitz. "A Symposium on the Plastic Deformation of Crystalline Solids." *Office of Technical Services, U. S. Department of Commerce,* 1950, p. 1-36.

An extensive review. 54 ref. (Q24)

310-Q. Multiplication Processes for Slow-Moving Dislocations. F. C. Frank and W. T. Read, Jr. "A Symposium on the Plastic Deformation of Crystalline Solids," *Office of Technical Services, U. S. Department of Commerce,* 1950, p. 44-46; disc., p. 46-48.

Describes, using diagrams, how the process can take place. (Q24)

311-Q. Creep of Zinc Crystals. E. P. T. Tyndall. "A Symposium on the Plastic Deformation of Crystalline Solids," *Office of Technical Services, U. S. Department of Commerce,* 1950, p. 49-58; disc., p. 58-59.

A simple, empirical law of creep is proposed for Zn-crystals with a secondary orientation equal to or nearly equal to zero. No indication is found of any sudden onset of slip or of a critical shear stress for its occurrence. Diagrams and graphs. 12 ref. (Q3, Zn)

312-Q. The Yield Point in Single Crystal and Polycrystalline Metals. A. H. Cottrell. "A Symposium on the Plastic Deformation of Crystalline Solids," *Office of Technical Services, U. S. Department of Commerce,* 1950, p. 60-73; disc., p. 73-76.

Characteristics of the yield phenomenon. 33 ref. (Q23)

313-Q. The Lamellar Nature of Slip and Its Implications. T. H. Blewitt and J. S. Koehler. "A Symposium on the Plastic Deformation of Crystalline Solids," *Office of Technical Services, U. S. Department of Commerce,* 1950, p. 77-86; disc., p. 86-88.

Some experiments on Al, $AuCu_3$, and α-brass single crystals. The various stages of deformation. 15 ref. (Q24, Al, Cu)

314-Q. The Origin of Dislocations. F. C. Frank. "A Symposium on the Plastic Deformation of Crystalline Solids," *Office of Technical Services, U. S. Department of Commerce,* 1950, p. 89-99; disc., p. 100-102.

Outlines the deformation process. Formation of dislocations under stress, the dynamic multiplication of dislocations, and the origin of initial dislocations. 15 ref. (Q24)

315-Q. The Experimental and Theoretical Results of Plasticity at Normal Speeds of Strain. U. Dehlinger. "A Symposium on the Plastic Deformation of Crystalline Solids," *Office of Technical Services, U. S. Department of Commerce,* 1950, p. 103-110; disc., p. 110-112.

Briefly reviews work done in the past 20 years at Stuttgart University, Germany. Some semi-empirical formulas describing the data obtained. 14 ref. (Q24, Q23)

316-Q. X-Ray Diffraction Studies of Cold Work in Metals. B. E. Warren and B. L. Averbach. "A Symposium on the Plastic Deformation of Crystalline Solids," *Office of Technical Services, U. S. Department of Commerce,* 1950, p. 113-121; disc., p. 122-123.

Results of measurements on filings of α-brass. Data are graphed. (Q24, M22)

317-Q. Dislocation Models of Crystal Grain Boundaries. W. T. Read and W. Shockley. "A Symposium on the Plastic Deformation of Crystalline Solids." *Office of Technical Services, U. S. Department of Commerce,* 1950, p. 124-149.

Grain-boundary models for certain specially simple cases. How the results may be extended so as to apply more generally. (Q24)

318-Q. The Resultant Content of Dislocations in an Arbitrary Intercrystalline Boundary. F. C. Frank. "A Symposium on the Plastic Deformation of Crystalline Solids." *Office of Technical Services, U. S. Department of Commerce,* 1950, p. 150-151; disc., p. 151-154.

Shows that the dependence of the dislocation density in the grain boundary depends upon the geometry of the situation. (Q24)

319-Q. A Study of Amplitude-Dependent Internal Friction Arising From the Motion of Dislocations in Single Crystals of Copper. A. S. Nowick. "A Symposium on the Plastic Deformation of Crystalline Solids." *Office of Technical Services, U. S. Department of Commerce,* 1950, p. 155-167; p. 167-170.

A quantitative study of the above as a function of frequency and temperature. Such measurements lead to information about the nature of the motion of dislocations at low

stress levels. Data are graphed. 11 ref. (Q22, Q24, Cu)

320-Q. Decrement and Young's Modulus Measurements on Single Crystals of Copper and Lead. J. Marx and J. S. Koehler. "A Symposium on the Plastic Deformation of Crystalline Solids." *Office of Technical Services, U. S. Department of Commerce,* 1950, p. 171-183; disc., p. 183-184.

Attempts to discover the physical causes for the various effects resulting from the investigation. Data are graphed. 10 ref. (Q21, Cu, Pb)

321-Q. Structure of Cold-Worked Metals as Deduced From Anelastic Measurements. T. S. Ke and C. Zener. "A Symposium on the Plastic Deformation of Crystalline Solids." *Office of Technical Services, U. S. Department of Commerce,* 1950, p. 185-191; p. 191-192.

Results of an investigation. Data are graphed for cold worked Al. (Q24, Q21, M26, Al)

322-Q. The Plasticity of Polycrystalline Solids. Bruce Chalmers. "A Symposium on the Plastic Deformation of Crystalline Solids." *Office of Technical Services, U. S. Department of Commerce,* 1950, p. 193-196; disc., p. 196-198.

It has been believed by many investigators that the best approach to the understanding of plasticity was to study first the behavior of single crystals, and then to use this information to elucidate the more complex case of a polycrystalline aggregate. Progress that has been made from this point of view and the difficulties that arise when an attempt is made to interpret polycrystalline plasticity in terms of single-crystal data. 12 ref. (Q23)

323-Q. Wanted: Experimental Support for Theories of Plastic Flow. J. C. Fischer and J. H. Hollomon. "A Symposium on the Plastic Deformation of Crystalline Solids." *Office of Technical Services, U. S. Department of Commerce,* 1950, p. 199-208; disc., p. 209-210.

Surveys various theories of the time-dependent deformation of metals. Creep curves for several metals. (Q24, Q3)

324-Q. A Theory of Deformation Textures in Face-Centered Cubic Metals. Walter R. Hibbard, Jr. "A Symposium on the Plastic Deformation of Crystalline Solids." *Office of Technical Services, U. S. Department of Commerce,* 1950, p. 211-215.

Includes numerous diagrams. 15 ref. (Q24)

325-Q. The Crystallographic Aspect of Slip in Body-Centered Cubic Single Crystals. A. Opinsky and R. Smoluchowski. "A Symposium on the Plastic Deformation of Crystalline Solids." *Office of Technical Services, U. S. Department of Commerce,* 1950, p. 216-223.

Results of a general analysis of the slip behavior of body-centered cubic lattices and also results of some preliminary experiments on Fe-Si alloys. Graphs. (Q24, Fe)

326-Q. The Prediction of Uranium Deformation Textures. E. A. Calnan and C. J. B. Clews. *Philosophical Magazine,* ser. 7, v. 43, Jan. 1952, p. 93-104.

Tension, compression and rolling textures were derived for the orthorhombic metal α-uranium. From a consideration of the relative importance of the slip and twinning mechanisms, it is possible to differentiate between the textures developed after slight and severe deformations at both room and elevated temperatures. (Q24, U)

327-Q. A Calculation of the Elastic Shear Constants of β-Brass. H. Jones. *Philosophical Magazine,* ser. 7, v. 43, Jan. 1952, p. 105-112.

The stability of β-brass, with respect to shears across the (110) plane in the direction [110], is considered and is shown to be due mainly to the change of the Fermi energy as a result of shearing of the Brillouin zone. The constitution of the elastic shear constants, as the sum of three terms, is examined and a satisfactory account of the observed values is obtained. Difficulty experienced in attempting to retain the β-phases by quenching. (Q21, Q2, Cu)

328-Q. Quantitative Measurement of Preferred Orientation in Rolled Uranium Bars. G. B. Harris. *Philosophical Magazine,* ser. 7, v. 43, Jan. 1952, p. 113-123.

The preferred orientation of uranium bars hot-rolled and cold-rolled in the α range was determined quantitatively by X-ray diffraction using a Geiger counter. Hot rolling with a slight reduction causes the (010) planes to become strongly and the (110) planes weakly oriented perpendicular to the rolling direction. Further hot rolling causes the (110) planes to become strongly and the (130) planes weakly oriented in the planes perpendicular to the rolling direction. (Q24, U)

329-Q. The Non-Hookean Interaction of a Dislocation With a Lattice Inhomogeneity. M. A. Jaswon and A. J. E. Foreman. *Philosophical Magazine,* ser. 7, v. 43, Feb. 1952, p. 201-220.

The equilibrium position of an edge dislocation near certain types of lattice irregularities was investigated quantitatively, using the Peierls model of a dislocation. The external shear stress required to maintain equilibrium was calculated and the result extended to an array of like dislocations piled up against a barrier. The integral equation for the atomic displacements is linearized by a perturbation technique, the resulting equation being solved exactly. 14 ref. (Q24, M26)

330-Q. Some Observations on Slip Lines in Iron. H. W. Paxton, M. A. Adams, and T. B. Massalski. *Philosophical Magazine,* ser. 7, v. 43, Feb. 1952, p. 257-258.

Slip lines on the polished surface of body-centered-cubic Fe single crystals are dependent on previous mechanical straining. (Q24, Fe)

331-Q. ISTC Division VIII Review of Boron Steel Development. *SAE Journal,* v. 60, Mar. 1952, p. 26-34. (Excerpts from report by D. L. McBride.)

Mechanical properties, composition, and weldability. Graphs and tabular data. (Q general, K9, AY)

332-Q. Biaxial Fatigue Tests on Flat-Plate Specimens. R. U. Blaser, J. T. Tucker, Jr., and L. F. Kooistra. *Welding Journal,* v. 31, Mar. 1952, p. 161s-168s.

A method of materials testing simulating the state of stress encountered in pressure-vessel service. This method was developed to obtain data on plate materials under cyclic biaxial stress conditions at minimum cost An experimental stress analysis is given for a ¾-in. thick specimen. Methods of detecting initiation of rupture, as well as final appearance of the fatigue fracture. Graphs and photomicrographs. (Q25, ST)

333-Q. Contribution to the Study of the Shape of Tensile Deformation Curves for Monocrystalline Specimens. (In French.) Bernard Jaoul and Charles Crussard. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Feb. 11, 1952, p. 700-702.

Factors which determine the shape of the curves and the position of various points on the curve. Illustrated by curves for monocrystalline Al of three degrees of purity. (Q27, Al)

334-Q. Belgian Research on Creep Resistant Steels. (In French.) O. Bihet. *L'Ossature Métallique,* v. 17, Feb. 1952, p. 89-90.

Includes graphical results obtained for four alloy steels. (Q3, AY)

335-Q. Influence of Structure on the Deformation of Metals. (In French.) J. Herenguel. *Métaux: Corrosion—Industries,* v. 27, Jan. 1952, p. 1-13.

Numerous macrographs and micrographs illustrate the concepts discussed, as applied to a variety of ferrous and nonferrous metals and alloys. Includes table showing the relationships of various fabrication processes to structural characteristics. (Q24, M27, M28)

336-Q. New Contribution to the Study of the Influence of Microstructure on the Heat Resistance of Steel. (In French.) Georges Delbart and Michel Ravery. *Revue de Métallurgie,* v. 49, Jan. 1952, p. 67-88.

Creep resistance of a Cr-Mo steel with a low C content varies as a function of microstructure, heat treatment, and load. Effects of preliminary annealing for 1000 hr. at 450 and 575° C., and for 300 hr. at 700° C. Tests were made on low-alloy Cr-Mo steels containing 0.31 and 0.53% C, with which it was possible to obtain more characteristic intermediate structures than with 0.12% C steel. Tables, micrographs, and charts. (Q3, M27, AY)

337-Q. A New Method for the Micromechanical Testing of Metals. (In French.) N. Mironoff. *Revue de la Soudure; Lastijdschrift,* v. 7, no. 4, 1951, p. 214-232.

Alternating-bend tests for determining the ductility of metals. Improvements on old methods. Schematic diagrams, graphs, and photomicrographs. (Q5, Q23)

338-Q. Statistical Investigation of the Tensile Strength of Cast Iron. (In German.) Gustav Meyersberg. *Archiv für das Eisenhüttenwesen,* v. 22, Nov.-Dec. 1951, p. 377-386.

Considerations on the basis of the Weibull formula concerning the breakage probability. Various experiments verifying these considerations. Data are tabulated and illustrated by schematic diagrams. (Q27, CI)

339-Q. Characterization of the Tendency Toward Brittleness of Steel in Notched-Bar Tensile and Tension-Impact Tests. (In German.) Wilhelm Kuntze. *Archiv für das Eisenhüttenwesen,* v. 22, Nov.-Dec. 1951, p. 387-393.

Three main types of brittleness; natural, latent, and shape brittleness. Tests for determining the various types. Data are tabulated and charted. (Q27, ST)

340-Q. Notched-Bar Tensile Tests on Heat Treated Structural Steel. (In

German.) Alfred Krisch. *Archiv für das Eisenhüttenwesen,* v. 22, Nov.-Dec. 1951, p. 395-400.

A series of tests on round notched and sharp notched bars at various temperatures. Results are indicated, data are tabulated and charted; 23 ref. (Q27, CN)

341-Q. Contribution to the Question of Fatigue Strength of Test Pieces of Various Sizes. (In German.) Max Hempel. *Archiv für das Eisenhüttenwesen,* v. 22, Nov.-Dec. 1951, p. 425-436.

A review on the basis of the literature and a series of experiments. Results for a series of carbon and alloy steels are tabulated and charted. 105 ref. (Q7, ST)

342-Q. Improving the Mechanical Properties of Low-Alloy Heat Treatable Steels by Adjusting Temperatures and Times of Heat Treating. (In German.) Walter Eilender, Heinrich Arend, and Werner Neuhaus. *Archiv für das Eisenhüttenwesen,* v. 23, Jan.-Feb. 1952, p. 67-72.

Several steels were investigated in order to improve their tensile and notch-impact strengths. Tabulated results are confirmed by industrial experiments. Tables, graphs, and numerous references. (Q general, AY)

343-Q. Properties and Applications of Commercial Electrical Strain Gages. (In German.) Kurt Fink and Christof Rohrbach. *Archiv für das Eisenhüttenwesen,* v. 23, Jan.-Feb. 1952, p. 75-80; disc., p. 80-81.

Different types of strain gages were investigated. Circuits are illustrated; data are graphed and tabulated. (Q25)

344-Q. The Influence of Impurities on the Properties of Metals. (In Dutch.) J. D. Fast. *Metalen,* v. 7, Jan. 15, 1952, p. 2-12; Jan. 31, 1952, p. 23-27; Feb. 15, 1952, p. 48-50.

Part I: Deleterious effects of inclusions on the mechanical properties of metals and alloys; also favorable effects. Part II: Very useful effects (mechanical hardening, magnetic hardening, and resistance to creep at high temperatures) can be obtained with inclusions formed by precipitation from supersaturated solid solutions. The same effects are deleterious if soft alloys (in the mechanical and magnetic sense) are desired. By studying the effects of carbon and nitrogen in pure Fe and in $FeMn_2$, a new explanation of magnetic aging of steel was obtained. Part III: Relationships between presence of inclusions and occurrence of dislocations. Several strain aging phenomena can be explained on the basis of Cottrell's theory; but others do not seem to fit this theory very well. Includes diagrams. 36 ref. (Q general, P16, M26)

345-Q. The Influence of Manganese, Silicon and Iron Contents Upon the Strength Properties of Aluminum-Zinc-Magnesium Alloys. (In German.) W. Mannchen. *Metall,* v. 6, Jan. 1952, p. 24-26.

Investigated on Al-Zn-Mg wires containing 4.5% Zn and 3.5% Mg. Data on tensile strength, elastic properties and shearing strength are tabulated and charted. 14 ref. (Q23, Al)

346-Q. Effect of Surface Condition on Fatigue Bending Strength. (In German.) K. Wellinger and P. Gimmel. *Metalloberfläche,* ser. A, v. 6, Jan. 1952, p. A4-A9.

Results of experiments indicate that metallographic polishing reduces the fatigue bending strength of different steels, and of Armco iron. Relationship of applied stress and of tensile strength to fatigue strength. Tables, graphs, and photomicrographs. (Q7, ST)

347-Q. Internal Friction of Liquid Copper-Silver and Gold-Copper Alloys. (In German.) Erich Gebhardt and Georg Wörwag. *Zeitschrift für Metallkunde,* v. 42, Dec. 1951, p. 358-361.

Experiments using an apparatus previously described and covering a range of temperature. Includes values for density. Data are tabulated and charted. (Q22, P10, Cu, Ag, Au)

348-Q. The Rolling and Recrystallization Textures of Pure Aluminum. (In German.) Hans Joachim Wallbaum. *Zeitschrift für Metallkunde,* v. 42, Dec. 1951, p. 371-376.

X-ray investigations. Investigations show that both types of structure depend on degree of rolling. Types of structures obtained at various rolling temperatures schematically illustrated. 99.5% Al sheet was studied. (Q24, Al)

349-Q. Effect of Lead on Modulus of Elasticity and Damping Properties of Copper, Silver, Ordinary Brass, and Red Brass. (In German.) Werner Köster and Lothar Bangert. *Zeitschrift für Metallkunde,* v. 42, Dec. 1951, p. 391-394.

Data for various compositions are charted, tabulated, and discussed. (Q21, Q8, Cu, Ag)

350-Q. Application of the Block Model of Electronic Theory to the Crystal Chemistry of Alloys. IV. Distortion of Simple Structures. (In German.) Konrad Schubert. *Zeitschrift für Metallkunde,* v. 43, Jan. 1952, p. 1-10.

The distorted systems frequently occurring in metallic structures. Possible explanations and effects of various factors. Application to a wide variety of specific alloy systems. Data are charted. 46 ref. (Q24, M26)

351-Q. Properties of Molybdenum and Tungsten at Low and Medium Temperatures. (In German.) Eduard Nachtigall. *Zeitschrift für Metallkunde,* v. 43, Jan. 1952, p. 23-26.

See abstract from *Powder Metallurgy Bulletin,* item 245-Q, 1951. (Q27, Q29, R2, Mo, W)

352-Q. Resistance to Breaking and Cutting. (In Russian.) N. N. Davidenkov. *Izvestiia Akademii Nauk SSSR,* Section of Technical Sciences, May 1951, p. 751-768.

Author's reply to discussion by G. V. Uzhik (Nov. 1950 issue; item 83-Q, 1951). Various questions of strength and plasticity are discussed. 48 ref. (Q23)

353-Q. Letter to the Editor. (In Russian.) N. P. Schchapov. *Izvestiia Akademii Nauk SSSR,* Section of Technical Sciences, May 1951, p. 769-770.

A discussion of the work of G. V. Uzhik in the field of strength and plasticity. (Nov. 1950 issue; item 82-Q, 1951.) Treats the question of stress concentration and the zone of plastic deformation around a fracture. (Q23, Q25)

354-Q. The Phenomena of Plasticity During Brittle Fracture of Soft Steels. (In Russian.) S. O. Tsobkallo. *Izvestiia Akademii Nauk SSSR,* Section of Technical Sciences, June 1951, p. 844-847.

Experimental study demonstrated a zone of plastic deformation in specimens broken at the temperature of liquid oxygen. Data are charted. (Q23, CN)

355-Q. Dependence Between Uzhik's Resistance to Fracture, Yield Strength and True Resistance to Fracture. (In Russian.) V. I. Kudriavtsev. *Izvestiia Akademii Nauk SSSR,* Section of Technical Sciences, June 1951, p. 941-944.

A discussion of the work by G. V. Uzhik in the field of strength and plasticity. Experiments were made which indicate that Uzhik's resistance to breaking is actually resistance to plastic deformation. Data are tabulated and charted. (Q23)

356-Q. The Examination of Sintered Metal Components. L. Northcott and C. J. Leadbeater. "Powder Metallurgy", His Majesty's Stationery Office (London), 1951, p. 23-32.

Includes tensile properties, hardness, density, microstructures, compositions, and frictional characteristics of a number of components of different types. Notes on the manufacture and uses of some of the components. Tabular data. (Q general, P10, M27, Fe, Cu, ST, Pb, Sn, C-n)

357-Q. The Tensile Strength of Titanium at Various Temperatures. R. L. Bickerdike and D. A. Sutcliffe. "Powder Metallurgy", His Majesty's Stationery Office (London), 1951, p. 153-159.

A quantity of Ti was prepared by the reduction of Ti tetrachloride with Mg. It was made into dense bars by powder-metallurgy methods, and from each annealed bar tensile-test pieces were machined. Tensile tests were performed at room temperature, 300, and 500° C.; and the maximum stresses at these temperatures determined. The metal contained about 99.7% Ti. 19 ref. (Q27, H general, Ti)

358-Q. Apparatus For Recording the Compressive Stress-Strain Curve for Thin Material Coupons at Large Strains. B. Bergqvist. *Aeronautical Research Institute of Sweden,* Report 39, 1951. 30 pages.

Apparatus consists mainly of a jig supporting the specimen against excess buckling. Some typical test results. (Q28)

359-Q. Some Aspects of the Charpy Test Applied to Steel Castings. J. E. Black. *American Foundryman,* v. 21, Mar. 1952, p. 56-58.

Serviceable steel castings may be rejected on the basis of Charpy impact tests if the specimens are cut from poorly designed test castings. Experiments show how ever-present micro conditions can be minimized to make impact tests reflect hardenability response and inherent toughness of cast steel. Illustrates how castings producers and Army Ordnance establishments cooperate. (Q6, E general, CI)

360-Q. Hardness Measurements for Determination of Residual Stresses. George Sines and Ronald Carlson. *American Society for Testing Materials,* Feb. 1952, p. 35-37.

Experimental evidence of effect of stress on penetration-hardness measurements. A method for measuring residual stresses by hardness measurements. A brief analysis of the effect of uni-axial stresses predicts the experimental results. Data for Armco iron, carbon steels, brass, Al, and Cu. (Q25, Q29, Fe, CN, Cu, Al)

361-Q. Effect of Cold Drawing on Creep-Resisting Molybdenum-Steel Steam Pipe. E. A. Jenkinson and D. C. Herbert. *Enginering,* v. 173, Mar. 14, 1952, p. 345-347. (A condensation.)

Cold drawing, during the intermediate stages of manufacture, has been used to improve the surface of carbon steel pipes, and these pipes have been put into service after normalizing without apparent detriment to their high-temperature creep resistance. Since the corresponding effect on Mo steel was not known, tests were made on two steels (0.9% Cr + 0.4% Mo and 0.5% Mo + 0.2% V). It was concluded that cold drawing of the two steels improves the surface finish, and does not result in any deterioration of the creep resistance of the steels, provided that the pipes were normalized after cold drawing. Both steels showed no tendency to graphitize on prolonged heating after welding, either in the cold drawn or hot drawn condition. (Q3, M27, AY)

362-Q. Creep of High-Purity Aluminum. *Industrial Heating,* v. 19, p. 432, 434.

Recent National Bureau of Standards research. (Q3, Al)

363-Q. Creep Relationships and Their Application to Pipes, Tubes, and Cylindrical Parts Under Internal Pressure. R. W. Bailey. *Institution of Mechanical Engineers, Proceedings,* v. 164, no. 4, 1951, p. 425-431.

Creep-strain relations for simple and complex stress at any stage of creep—primary, secondary, or tertiary; stress distribution and creep of cylindrical parts under internal pressure, and related formulas for wall thickness; determination of design temperature to provide for specific temperature and pressure fluctuations; and action of creep in removing the thermal-expansion loading of a pipeline. Numerous graphs. (Q3)

364-Q. Creep Under Complex Stress Systems at Elevated Temperatures. A. E. Johnson. *Institution of Mechanical Engineers, Proceedings,* v. 164, no. 4, 1951, p. 432-446.

See abstract from *Aircraft Engineering,* item 172-Q, 1952. (Q3, CN, Al, Mg, Ni)

365-Q. How to Design for Repeated Loads. R. L. Templin and E. C. Hartmann. *Iron Age,* v. 169, Mar. 27, 1952, p. 98-101.

Recommended procedures. "Do's" and "dont's" for obtaining increased fatigue strength are presented in tabular form. (Q7)

366-Q. Determination of Elastic Constants and Stress-Strain Relationship to Fracture of Sintered Tungsten Carbide-Cobalt Alloys. E. Lardner and N. B. McGregor. *Journal of the Institute of Metals,* v. 80, Mar. 1952, p. 369-374.

Results of experiments show that, at room temperature, Young's modlus decreases considerably, and Poisson's ratio increases slightly, with rise in Co content. Determinations of Young's modulus between room temperature and 600° C. indicate a total decrease of the order of 5-6% at 600° C., the rate of decrease being almost uniform and independent of the amount of Co. There is evidence from the stress-strain relationship that when Co exceeds about 11%, some plastic deformation occurs at stresses well below the room-temperature fracture strength. Graphs and tables. (Q21, W, Co, C-n)

367-Q. The Stress-Strain Diagram of Timepiece Springs. (In Japanese.) Tetsutaro Mitsuhashi, Ryuichi Nakagawa, and Saburo Saito. *Journal of Mechanical Laboratory,* v. 5, Oct. 1951, p. 247-251.

To determine permanent set, an apparatus was developed to record the stress-strain curve. The specimen was high-carbon steel wire drawn to 0.5 mm. diam. Apparatus is diagrammed. Data are charted and tabulated. (Q27, CN, SG-b)

368-Q. Wear and Damage to Underground Pumps. II. (In Japanese.) Ichiro Onuma. *Journal of Mechanical Laboratory,* v. 5, Oct. 1951, p. 252-261.

204 pumps located in a Japanese coal mine were inspected. Causes of breakdown are allocated percentagewise to the following causes: wear, corrosion, seizure, and others, for the various parts. Data are charted and tabulated; diagrams show the parts involved. (Q9, R8)

369-Q. Studies of the Application of Materials. (In Japanese.) **VIII. Evaluation of Spring Steel.** Hisao Matsumoto and Kaoru Kamada. **IX. The Mechanism of Tensile Failure of Chain.** Hisao Matsumoto, Katsuyoshi Kimura, and Kaoru Kamada. *Journal of Mechanical Laboratory,* v. 5, Oct. 1951, p. 235-240; Nov. 1951, p. 279-284.

Results of experiments are tabulated, charted, and analyzed. (Q general, AY, CN)

370-Q. Wear of Steel Against Soils. III. (In Japanese.) Tetsutaro Mitsuhasi, Yutaka Imai, and Shin Yokoi. *Journal of Mechanical Laboratory,* v. 5, Nov. 1951, p. 294-298.

Using the hand drill type of wear-testing machine, three carbon steels and a 1.56% Cr steel were studied. Results are charted and tabulated. (Q9, CN, AY)

371-Q. A Constant Stress Creep Test Apparatus. A. Latin. *Journal of Scientific Instruments,* v. 29, Mar. 1952, p. 98-99.

Briefly described and diagrammed. (Q3)

372-Q. How Can We Appraise Metals for High-Temperature Service? Thomas J. Dolan. *Metal Progress,* v. 61, Mar. 1952, p. 55-60.

Principal observations on the factors influencing the fatigue strength of metals at high temperatures. (Q7, AY, CN, SG-h)

373-Q. Course of Impact Fracture. L. H. Satz. *Metal Progress,* v. 61, Mar. 1952, p. 79-80.

Impact tests made on welded stainless bars. The path of fracture was apparently influenced by the presence of tougher material in the immediate vicinity. (Q6, SS)

374-Q. Typical Properties of Beryllium-Copper Alloys. J. T. Richards. *Metal Progress,* v. 61, Mar. 1952, p. 80B.

A data sheet.
(Q general, P general, Cu)

375-Q. Effect of Hydrogen on Low-Alloy Steels. *Metal Progress,* v. 61, Mar. 1952, p. 114, 116, 118.

See abstract of "Effect of Hydrogen on the Properties of Low-Alloy Steels", J. D. Hobson and C. Sykes, *Journal of the Iron and Steel Institute;* item 67-Q, 1952. (Q23, AY)

376-Q. Creep Properties of Austenitic Alloys. *Metal Progress,* v. 61, Mar. 1952, p. 156, 158, 162.

See abstract of "Creep Properties of Austenitic Alloys in Relation to the Constitution Diagram", A. M. Borzdyka, *Doklady Akademii Nauk SSSR,* item 43-Q, 1951.
(Q3, Fe, Cr, Ni)

377-Q. A Note on Estimating Yield-Point Loads in a Plastic-Rigid Body. R. Hill. *Philosophical Magazine,* ser. 7, v. 43, Mar. 1952, p. 353-355.

Limits are obtained for the error involved in use of an approximate theory of plasticity to estimate yield-point loads. Illustrates these by using the Mises yield function and potential to approximate the Taylor-Quinney data for Cu and Al.
(Q23, Cu, Al)

378-Q. Effect of Strain Ageing Upon the Distribution of Glide Bands in Cadmium Crystals. D. F. Gibbons. *Proceedings of the Physical Society,* v. 65, sec. B, Mar. 1, 1952, p. 193-195.

There is a marked difference in the distributions of visible glide bands, after plastic deformation, between Cd crystals containing small amounts of N_2 and those relatively free from N_2. The distribution of glide bands in the crystals containing N_2 is compared with Lüders bands in strain aged mild steel.
(Q24, Cd, CN)

379-Q. On Cracks and Dislocations in Shafts Under Torsion. Alexander Weinstein. *Quarterly of Applied Mathematics,* v. 10, Apr. 1952, p. 77-80.

Mathematical analysis. 10 ref.
(Q1)

380-Q. The Bauschinger Effect in Iron Single Crystals. N. H. Polakowski. *Research,* v. 5, Mar. 1952, p. 143-144.

Results of experiments on large iron single crystals. (Q24, Fe)

381-Q. Hydrogen Causes Embrittlement of Forged Compressor Blades. A. E. Durkin. *Steel,* v. 130, Mar. 24, 1952, p. 76, 78.

Failure of stainless steel blades and its prevention. Electrolytic surface corrosion builds up H_2 pressure, resulting in eventual cracking. Painting decreases susceptibility to embrittlement. (R1, Q23, SS)

382-Q. What Boron Steels to Use—and Why. H. B. Knowlton. *Steel,* v. 130, Mar. 24, 1952, p. 84, 86.

Properties of boron steel and basis for its substitution for critical alloys. (Q general, AY)

383-Q. The Torsion Test for Wire. J. G. Walford. *Wire Industry,* v. 19, Mar. 1952, p. 233-235, 280.

Effect of specimen length and tensile stress on the number of twists to fracture. (Q1, CN)

384-Q. Measurement and Calculation of Stresses in a Flywheel. (In Italian.) G. Oberti and G. Moravia. *Metallurgia Italiana,* v. 44, Feb. 1952, p. 78-82.

Experimental technique followed in measuring, by means of electrical resistance strain gages, the strains arising from centrifugal forces in a large flywheel. Simultaneous theoretical calculation. Good agreement was achieved. (Q25)

385-Q. The Structure of Cast Iron Rolls. (In Polish.) J. Jastrzebska. *Prace Glownego Instytutu Metalurgii,* v. 3, no. 6, 1951, p. 463-489.

General working conditions for cast iron calibrated grain rolls as well as for chilled rolls intended for sheet. The effects of microstructure and macrostructure of the rolls on mechanical properties. Cast iron rolls used in Poland in section roll-

ing mills are classified and optimum structures established on the basis of tests and analysis of structures, wear statistics, and comparison of structures of Polish and foreign rolls. Tables, graphs, and micrographs. 14 ref.
(Q general, M27, T5, CI)

386-Q. Some Factors Affecting Creep of Carbon Steel. (In Polish.) Z. Borysowski and W. Tomaszczyk. *Prace Glownego Instytutu Metalurgii,* v. 3, no. 6, 1951, p. 507-515.

Effects of chemical composition and other metallurgical factors. Results are charted and tabulated. 21 ref. (Q3, CN)

387-Q. Electronics in Automobile Engineering Research. J. R. Bristow. *Electronic Engineering,* v. 24, Apr. 1952, p. 189-192.

Use for measuring stress in vehicle structures, torsional fatigue, road performance parameters, and noise in vehicles. (Q25, Q7)

388-Q. A New Development in Bonded Electric Wire Resistance Strain Gauges. A. U. Huggenberger. *Engineers' Digest,* v. 13, Mar. 1952, p. 77-79. (Translated and condensed.)

Previously abstracted from the *Schweizer Archiv für angewandte Wissenschaft und Technik.* See item 219-Q, 1952. (Q25)

389-Q. Effect of Basic Cupola Operation on Tensile Strength of Gray Iron. W. T. Bourke and T. J. Wood. *Foundry,* v. 80, Apr. 1952, p. 86-87, 217-218.

Summary of results obtained on a full-scale pilot operation.
(Q27, E10, CI)

390-Q. Reinforcing Steel in Concrete and the Concept of Safety. K. Hajnal-Konyi. *Journal of the American Concrete Institute,* v. 23, Mar. 1952; *ACI Proceedings,* v. 48, 1952, p. 561-580.

Comparative tests on 36 beams regrade concrete, prove the superiority of cold worked steel over steel having a natural yield point, as regards safety factor and warning before failure. They also prove advantages of deformed bars over plain bars. (Q23, CN)

391-Q. The Hot-Torsion Test for Assessing Hot-Working Properties of Steels. D. E. R. Hughes. *Journal of the Iron and Steel Institute,* v. 170, Mar. 1952, p. 214-220.

The design and construction of a hot-torsion testing machine, and a suitable experimental technique. Tests on mild steel and high-carbon Cr steel specimens over the ranges 950-1400° C. and 12-600 r.p.m., respectively, were made. Results are charted, tabulated, and discussed. Macrographs and micrographs show structures of broken test specimens. 12 ref. (Q1, CN, AY)

392-Q. Discussion on the Paper—Physical and Mechanical Properties of Segregates in Two Alloy Steels, by H. M. Finniston and T. D. Fearnehough. *Journal of the Iron and Steel Institute,* v. 170, Mar. 1952, p. 221-225.

Paper published in Sept. 1951 issue; item 680-Q, 1951.
(Q general, M27, AY)

393-Q. Viscous Creep of Gold Wires Near the Melting Point. F. H. Buttner, E. R. Funk, and H. Udin. *Journal of Metals,* v. 4, Apr. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 401-407.

Gold wires, 5 mil. in diam., were found to creep viscously up to approximately 5.5×10^5 dynes per sq. cm. around 1300° K. Beyond this point, an additional slip mechanism appears. Observations made during the experiments agree with Herring's predictions. Graphs and tables. 21 ref. (Q3, Au)

394-Q. Properties of Molybdenum Made by Arc Casting and Powder Metallurgy. James H. Bechtold and Howard Scott. *Metal Progress,* v. 61, Apr. 1952, p. 82-88.

Metal preparation, tensile properties, ductility, creep-rupture tests, and alloying for improvements.
(Q23, Q3, H general, E10, Mo)

395-Q. Problems of Metallic Fatigue at High Temperature. Thomas J. Dolan. *Metal Progress,* v. 61, Apr. 1952, p. 97-104.

Some specific alloys and special tests for severe services at high temperatures. In addition to high mechanical strength at elevated temperature, it is desirable that an alloy exhibit good ductility; resistance to erosion, oxidation, or chemical attack; high fatigue strength; and adequate stability. Tables and graphs. (Q7, SG-g, h)

396-Q. Friction and Wear at High Speeds and Pressures. *Metal Progress,* v. 61, Apr. 1952, p. 114, 116, 118, 120. (Condensed from "Preliminary Investigation of Wear and Friction Properties Under Sliding Conditions of Materials Suitable for Cages of Rolling-Contact Bearings", R. L. Johnson, M. A. Swikert, and E. E. Bisson.

Previously abstracted from *National Advisory Committee for Aeronautics,* Technical Note 2384. See item 459-Q, 1951.
(Q9, ST, Be, Cu, Ni, Al, Fe)

397-Q. Investigation of Fretting by Microscopic Observation. Douglas Godfrey. *National Advisory Committee for Aeronautics,* Report 1009, 1951, 10 pages.

An experimental investigation, using microscopic observation and color motion photomicrographs, was conducted to determine the cause of fretting. Glass and other noncorrosive materials, as well as metals, were used as specimens. A simple apparatus vibrated convex surfaces in contact with stationary flat surfaces at frequencies of 120 cycles or less than 1 cycle per sec., an amplitude of 0.001 in., and a load of 0.2 lb. Fretting of clean nonmetals and metals occurred readily, and glass microscope slides and steel balls provided an excellent method for visual studies. (Q9)

398-Q. Effect of Heating at 200 and 500° F. on the Properties of Aluminum and Copper Wires. Allen S. Russell. *Wire and Wire Products,* v. 27, Mar. 1952, p. 255-256.

Limited investigation of the effect of heating in air at 300 and 500° F. on electrical and tensile properties of annealed Cu and hard drawn Al wires. Tabular data.
(Q27, P15, Cu, Al)

399-Q. Beryllium Copper Wire: Property and Design Considerations. John T. Richards. *Wire and Wire Products,* v. 27, Mar. 1952, p. 257-262, 303-307.

Physical, mechanical, and corrosion-resistant properties. Certain design features; a modified design may prove more advantageous than making a direct substitution of another material for Be-Cu. Tabular data. 20 ref.
(Q general, P general, R general, Cu)

400-Q. The Question of Strength Criteria. (In Russian.) G. I. Gurevich. *Doklady Akademii Nauk SSSR,* new ser., v. 82, Jan. 11, 1952, p. 245-248.

A theoretical discussion of equations describing the relationships of stress and strain in a uniform isotropic body. (Q23)

401-Q. (Book) **Buckling Strength of Metal Structures.** Friedrich Bleich and Lyle B. Ramsey. 508 pages. 1952. McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y. $10.00.

Data on behavior of fabricated steel structures under compression loading. Covers available literature on the subject and much original work. Concentrates on problems frequently encountered in the design of engineering and naval structures. Numerous references, formulas, tables, graphs. (Q28)

402-Q. (Book) **Mechanical Tests for Metals (Excluding Welds).** British Standard Handbook No. 13, 243 pages. 1951. British Standards Institution, 24 Victoria St., Westminster, London, S.W. 1, England. 17/6 net.

Standards, dealing solely with mechanical testing, together with extracts from other standards to illustrate particular applications of the tests, have been collected to form a new handbook. Numerous illustrations; comprehensive tables.
(Q general, S22)

403-Q. (Book) **Molesworth's Handbook of Engineering Formulae and Data.** Ed. 34. Albert Peter Thurston, editor. 1672 pages. 1951. E. & F. N. Spon, Ltd., 22 Henrietta St., London, W. C. 2, England.

Civil and general engineering. Includes data on materials of construction and extensive welding information.
(Q general, T26, K general)

404-Q. (Book) **Strength of Materials.** Max M. Frocht. 439 pages. 1951. Ronald Press Co., 15 E. 26th St., New York.

Contemporary problems and methods of investigating strength of materials. First three chapters deal with fundamental concepts and statically determinate problems in tension, compression, bending, and torsion. Remaining chapters give detailed discussion on various aspects of strains and stresses. Chapter problems. (Q23)

405-Q. (Book) **A Symposium on the Plastic Deformation of Crystalline Solids.** 223 pages. 1950. Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C.

Covers meeting held at Mellon Institute, Pittsburgh, May 19-20, 1950, under joint sponsorship of Carnegie Institute of Technology and Office of Naval Research. Individual papers are separately abstracted. (Q24)

406-Q. Methods for the Improvement of Drill-Collar Joints Evaluated by Full-Size Fatigue Tests. L. E. Thrishman. *Drilling,* v. 13, Apr. 1952, p. 99-100, 102; disc. p. 103.

Possible methods of improvement, applicable to almost any joint design. Full-size fatigue tests show what these methods will contribute in the way of increased resistance to fatigue failure of drill-collar joints. Graphs and diagrams.
(Q7, ST)

407-Q. Effect of Individual Factors in Microhardness Tests. E. M. Shvet-

sova and T. V. Lebedeva. *Industrial Diamond Review,* v. 12, Mar. 1952, p. 50-52.

A study of the factors of inaccuracies in working the microhardness tester, peculiarities of single crystals, effect of varying strength of grains, nonuniformity in structure of metal, and change generally in test pieces at surface or otherwise. (Q29, Ni, Al, Mg, Cu)

408-Q. Impact Strength of 4140 v. TS 4140 Reported. *Iron Age,* v. 169, Apr. 24, 1952, p. 148.

Results in graphical form; conditions. (Q6, AY, TS)

409-Q. Production Problems. XIV. Hard and Soft Blake Hooks. *Iron and Steel,* v. 25, Apr. 1952, p. 129-130.

Due to variation in the hardness of fully processed Blake hooks after heat treatment, a general hardness survey was made on selected hooks. Hardness test results. (Q29, AY)

410-Q. A Cause of Brittleness in Stainless Steels. J. Lomas. *Machinery Lloyd* (Overseas Edition), v. 24, Mar. 29, 1952, p. 99-100.

Deals with the sigma phase in reference to ductility of Fe-Cr or Fe-Cr-Ni alloys at high temperatures. (Q23, SS)

411-Q. Some Observations on the Determination of Residual Stresses in Cylindrical Metal Bodies by Sach's Boring Method. R. A. Dodd. *Metallurgia,* v. 45, Mar. 1952, p. 109-114.

A critical, general discussion and proposal of an experimental technique. Data concerning strains introduced by machining process; use of strain gages; and comparison with X-ray measurements. Tables, graphs, and photographs. (Q24)

412-Q. The Determination of Local Wear by the Use of Disappearing Marks. *Metallurgia,* v. 45, Mar. 1952, p. 151-153.

Various methods which utilize measurements on a depression made in a surface. Includes a Russian-reported "cut lune" method. Photomicrographs. (Q9)

413-Q. Effect of Surface Films on the Twinning of Metal Crystals. Ronald King. *Nature,* v. 169, Mar. 29, 1952, p. 543-544.

Electrodeposited layer of Cu raises the stress necessary to cause twinning in single crystals of Zn. Long single crystals, 1 mm. in diameter were grown and cut into several lengths which were given different surface treatments. The specimens were then tested in tension in a rigid frame apparatus in which the strain was brought about by means of a micrometer screw movement. A Polanyi beam was used for measuring the stress with a high degree of sensitivity. Stress-strain curves were obtained, and the onset of twinning, being accompanied by a sudden drop in stress, was readily detected. (Q24, Cu, Zn)

414-Q. Elastic and Plastic Properties of Very Small Metal Specimens. Conyers Herring and J. K. Galt. *Physical Review,* Ser. 2, v. 85, Mar. 15, 1952, p. 1060-1061.

Investigated by performing experiments on the thin whiskers which grow out from the surfaces of a number of low-melting-point metals. Observations were made on some Sn whiskers grown from a Sn-plated surface. (Q21, Q23, Sn)

415-Q. Fatigue Tests Under Axial Loads of Joints Bonded With Resinous Adhesive. W. N. Findlay, B. A. Century, and C. P. Hendrickson. *Sheet Metal Industries,* v. 29, Apr. 1952, p. 353-357.

Previously abstracted from *ASTM Bulletin.* See item 299-Q, 1952. (Q7, Al)

416-Q. Welded Reinforcement of Openings in Structural Steel Members. D. Vasarhelyi and R. A. Hechtman. *Welding Journal,* v. 31, Apr. 1952, p. 169s-180s; disc. 180s-183s.

Tests were made to determine the unit strain energy and the true stress distribution in the plastic range of the material in a flat plate with a centrally located opening, which was square with rounded corners. Two such plates made from plain carbon semi-killed structural steel were tested in tension, one at room temperature and the other at −20° F. The first failed with a complete shear fracture and the other with a fracture almost entirely cleavage. The octahedral theory was used to determine the unit strain energy distribution, while the true stresses were computed by a method developed in the course of the investigation. (Q27, CN)

417-Q. Fatigue Tests on Aluminum Alloy Spot-Welded Joints. Marshall Holt and E. C. Hartmann. *Welding Journal,* v. 31, Apr. 1952, p. 183s-187s.

A comparison of results of fatigue tests of spot welded joints in sheets of various high-strength Al alloys. 10 ref. (Q7, K3, Al)

418-Q. Fracture Initiation and Propagation in Welded Ship Steels. P. J. Rieppel and C. B. Voldrich. *Welding Journal,* v. 31, Apr. 1952, p. 188s-198s; disc. p. 198s-201s.

The initiation and propagation of fractures in welded and prime-plate Kinzel-type transversely notched bead-bend specimens were investigated. Results suggest that the data from many welded test specimens be re-examined. It seems likely that poor performance, which has been believed to be caused by heat-affected zones, may in reality be directly related to weld-metal performance. (Q26, K general, CN)

419-Q. Upper and Lower Transitions in Charpy Tests. Discussion. R. W. Vanderbeck and W. P. Roop. *Welding Journal,* v. 31, Apr. 1952, p. 201s-204s.

Discussion of paper by W. J. Harris, Jr., J. A. Rinebolt and R. Raring published in Sept. 1951 issue (item 665-Q, 1951). (Q6, CN)

420-Q. Residual Stress and the Yield Strength of Steel Beams. Ching Huan Yang, Lynn S. Beedle, and Bruce G. Johnston. *Welding Journal,* v. 31, Apr. 1952, p. 205s-229s.

Analytical and experimental study of the elastic and plastic behavior of welded continuous steel beams. Stress concentration, residual stresses and other factors which affect the yield strength of steel members. Basic assumptions of the simple plastic theory are compared with the test results. Influence of residual stress on buckling strength of columns. 22 ref. (Q23, Q25, ST)

421-Q. The Micro-Mechanism of Fracture in the Tension Impact Test. Discussion. Glenn W. Geil. *Welding Journal,* v. 31, Apr. 1952, p. 230s-231s.

Discussion of paper by Walter H. Bruckner, published in Sept. 1951 issue (item 669-Q, 1951). (Q27, CN)

422-Q. Statistical Study of the Correlation Between the Composition of an Ordinary Cast Iron and Its Mechanical Properties. (In French.) Jorgen Drachmann. *Fonderie,* Jan. 1952, p. 2755-2762.

The relationships between chemical composition, machinability, Brinell hardness, and the depth of hardening of an ordinary cast iron were investigated. Data are charted.
(Q general, S12, CI)

423-Q. Influence of the Dispersion (Microstructure) of a Metal on Its Plastic Flow in Active Media. (In Russian.) T. A. Amfiteatrova and B. Ia. Iampol'skii. *Doklady Akademii Nauk SSSR,* v. 82, Feb. 11, 1952, p. 735-738.

The influence of surface-active materials on the creep of polycrystalline Cu and Al was investigated using a special apparatus, in contact with kerosine; butyl hexyl, octyl, and cetyl alcohol, oleic acid, and dioctyl sulfosuccinate were investigated. Data are tabulated and charted; apparatus is diagrammed.
(Q3, P10, M27, Cu, Al)

424-Q. Effects of Cerium on Graphite Formation in Alloy Cast Iron. Edward A. Rowe and Howard A. Johnson. *American Foundrymen's Society,* Preprint 52-1, 1952, 5 pages.

Concerned with the effect of Ce on an alloy cast iron containing Ni, Mn, and Mo. Changes in graphite structure, tensile strength, and hardness caused by the Ce additions. Addition of a secondary graphitizing inoculant with the Ce. Micrographs and tables.
(Q23, Q29, M27, CI)

425-Q. A Test for Hot Tearing Tendency. E. A. Lange and R. W. Heine. *American Foundrymen's Society,* Preprint 52-14, 1952, 14 pages.

Test apparatus and procedure. Results with white cast irons. Graphs, diagrams, tables, and illustrations.
(Q26, CI)

426-Q. Zinc in Aluminum Casting Alloys. Donald L. Colwell. *American Foundrymen's Society,* Preprint 52-38, 1952, 8 pages.

In nominal quantities in excess of most current specifications, Zn has a beneficial effect on mechanical properties and machinability and no adverse effects on castability or corrosion resistance. Emphasis is on the common Cu-Si casting alloys, both in the as-cast and heat treated conditions. The danger in Mg as an impurity, particularly in alloy CS64C, and also the neutral effects of Zn on alloy S5C.
(Q general, G17, R general, Al, Zn)

427-Q. Metallurgy and Mechanics of Hot Tearing. H. F. Bishop, C. G. Ackerlind, and W. S. Pellini. *American Foundrymen's Society,* Preprint 52-65, 1952, 14 pages.

Solidification conditions during hot tearing of steel castings were determined by simultaneous radiography and thermal analysis. Corollary strength tests coupled with thermal analysis showed that development of high strength followed immediately upon elimination of film regions. Variables such as C, P, S and pouring temperature were investigated. A new generalized theory is presented. 16 ref.
(Q23, E25, CI)

428-Q. Influence of Aluminum on Properties of Cast Gun Metal and Removal of Aluminum by Slag. Ake V. Larsson. *American Foundrymen's Society,* Preprint 52-70, 1952, 8 pages.

Influence of Al on the strength and pressure tightness of 83-6-5-6 gunmetal. Different refining agents were tested for removal of Al from brass and gunmetal melts. Practical recommendations. Tables and graphs. (Q23, E25, Cu)

429-Q. Experimental Study of Sliding Friction. Charles A. Maney. *American Journal of Physics,* v. 20, Apr. 1952, p. 203-210.

Coefficient of sliding friction is not a constant but varies with several factors. Pb, Al, steel, brass, and some nonmetals were studied. Tables and graphs. (Q9, Pb, Al, ST, Cu)

430-Q. Determination of Principal Plastic Strains. W. E. Cooper. *American Society of Mechanical Engineers,* Paper 51-A-128, 1951, 10 pages.

Techniques whereby the grid method of plastic-strain determination may be extended to include determination of strain at a point, rather than over a finite gage length; and determination of principal strain, magnitude and direction, when these directions are not necessarily in alignment with the original grid. Measurement may be made in terms of either the tensor or logarithmic definitions of finite strain. (Q27)

431-Q. A Criterion for the Failure of Cast Iron. John C. Fisher. *ASTM Bulletin,* Apr. 1952, p. 74-75.

Experimental results to substantiate the theory that failure of cast iron is governed by the laws of plastic deformation. (Q23, CI)

432-Q. Creep of Metals. *Automobile Engineer,* v. 42, Apr. 1952, p. 154-156.

Application of creep data to design problems. Graphical data on carbon steel. (Q3, CN)

433-Q. Summarized Proceedings of a Conference on Stress Analysis Liverpool, 1951. *British Journal of Applied Physics,* v. 3, Apr. 1952, p. 105-114.

Nine papers, dealing with numerical methods, electric resistance strain-gage methods, developments in France, fatigue, and photoelastic work are summarized. 11 ref. (Q25)

434-Q. Elevated-Temperature Fatigue-Testing Machine for Ceramic Materials. J. Dick and L. S. Williams. *Engineering,* v. 173, Apr. 4, 1952, p. 422-423.

Machine developed in the course of an investigation of the mechanical fatigue endurance and delayed fracture properties of simple ceramics and alumina-base "cermets" (composite metal-ceramic bodies) at ordinary temperatures and elevated temperatures. (Q7)

435-Q. Survey of the Study of Hardness. J. A. Kohn. *Industrial Diamond Review,* new ser., v. 12, Apr. 1952, Supplement, p. 1-16.

Reviews various methods for determining hardness of minerals. 3-page bibliography. (Q29)

436-Q. Effects of Working on the Properties of Molybdenum. E. S. Byron and R. F. Baker. *Journal of the Electrochemical Society,* v. 99, May 1952, v. 194-196.

Solid ingots of Mo were prepared by powder metallurgy. Two wedges were machined. These were rolled to ⅜ in. thickness at 1200° C. in a single pass. One wedge was air cooled after rolling and the other was annealed for 1 hr. at 950° C. Degree of height reduction, hardness measurements, and tensile tests of properties transverse to rolling direction. (Q general, H general, Mo)

437-Q. The Effect of Grain-Size on the Structural Changes Produced in Aluminium by Slow Deformation. W. A. Rachinger. *Journal of the Institute of Metals,* v. 80, Apr. 1952, p. 415-418.

X-ray diffraction and metallographic methods were used to study the internal derangement of Al polycrystals of various grain sizes after slow deformation at elevated temperatures. The present work indicates that for a given temperature and rate of straining the effect of an increase in grain size is roughly equivalent to a decrease in temperature or an increase in strain rate. Further evidence is produced to confirm the existence of a deformation-induced substructure within the grains. (Q24, N3, Al)

438-Q. Observations on the Structure and Properties of Wrought Copper-Aluminium-Nickel-Iron Alloys. Maurice Cook, W. P. Fentiman and Edwin Davis. *Journal of the Institute of Metals,* v. 80, Apr. 1952, p. 419-429.

A study was made of the structure and properties of complex Al bronzes containing 8-12% Al and 4-6% each of Ni and Fe. The mechanical properties of alloys containing 8, 10, and 12% Al with 5% each of Ni and Fe, representative of the three main structural classes, were determined in the quenched, quenched and tempered, hot rolled, and hot rolled and annealed conditions, and these properties are related to the structures. The effect of cold-rolling on the mechanical

properties of this alloy was determined, and the structure and properties of extruded and annealed rod studied. 10 pages of photomicrographs. (Q general, M27, Cu)

439-Q. The Deformation of Low-Carbon Steel in the Blue-Brittle Range. E. O. Hall. *Journal of the Iron and Steel Institute,* v. 170, Apr. 1952, p. 331-336.

A study of the Lüders deformation of bessemer and Armco iron wires and thin strip. Jagged stress-strain curves arise from interrupted propagation of fronts of the Lüders bands, and from formation of new bands in strain-aged material. (Q24, CN)

440-Q. Structural Studies of Plastic Deformation in Aluminum Single Crystals. *Journal of Metals,* v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 526-529.

Discussion of paper by N. K. Chen and C. H. Mathewson; item 457-Q, 1951. (Q24, Al)

441-Q. Effect of Alloying Elements on the Elevated Temperature Plastic Properties of Alpha Solid Solutions of Aluminum. *Journal of Metals,* v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 529.

Discussion of paper by O. D. Sherby, R. A. Anderson, and J. E. Dorn; item 456-Q, 1951. (Q23, N7, Al)

442-Q. Creep Characteristics of Some Platinum Metals at 1382° F. *Journal of Metals,* v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 530-531.

Discussion of paper by R. H. Atkinson and D. E. Furman; item 620-Q, 1951. (Q3, Pt, Pd)

443-Q. Creep Behavior of Zinc Modified by Copper in the Surface Layer. *Journal of Metals,* v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 531-532.

Discussion of paper by Milton R. Pickus and Earl R. Parker; item 619-Q, 1951. (Q3, Zn)

444-Q. Creep and Stress Rupture Behavior of Aluminum as a Function of Purity. *Journal of Metals,* v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 532-533.

Discussion of paper by Italo S. Servi and Nicholas J. Grant; item 682-Q, 1951. (Q3, Q4, Al)

445-Q. Titanium—Metals of Tomorrow. James V. Thompson. *Mines Magazine,* v. 42, Apr. 1952, p. 19-24.

Physical and mechanical properties are compared with Al, Mg, stainless, low-carbon steel, and brass. Advantages and outstanding qualities.
(Q general, P general, Ti, Al, Mg, SS, AY, Cu)

446-Q. Friction and Wear. J. Pomey. *National Advisory Committee for Aeronautics,* Technical Memorandum 1318, Mar. 1952, 108 pages. (Translated from Office National d'Etudes et de Recherches Aeronautiques, Rapport Technique No. 36, 1948.)

General remarks on friction and wear; hydrodynamic lubrication; greasy (boundary) friction; seizure; and dry friction. Includes discussion of bearing-metal factors. (Q9, SG-c)

447-Q. Hydrogen Embrittlement of Steel; Review of the Literature. R. W. Buzzard and H. E. Cleaves. *National Bureau of Standards,* Circular 511, Sept. 24, 1951, 29 pages.

Includes selected bibliography of about 1200 references. (Q23, ST)

448-Q. Interferometric Studies of Hardness Test Indentations: Investigations on Tungsten Carbide, Steel, Duralumin and Tin. S. Tolansky and D. G. Nickols. *Philosophical Magazine,* ser. 7, v. 43, Apr. 1952, p. 410-421.

Studies were made on surface distortions which occur on metal surfaces which have received hardness test indentations from both diamond pyramid and diamond cone indenters. 11 ref.
(Q29, C-n, ST, Al, Sn, W)

449-Q. Twin Formation in Cadmium. N. Thompson and D. J. Millard. *Philosophical Magazine,* ser. 7, v. 43, Apr. 1952, p. 422-440.

Experiments on the formation of twins in single-crystal wires of Cd under tension demonstrate the essentially discontinuous nature of the process of twin growth, and produce evidence in favor of a critical resolved shear stress law for twinning. Twinning can contribute to creep at room temperature but not at 90° A. Dislocation mechanism for the growth of a twin. 18 ref. (Q24, Cd)

450-Q. The Nature of Work-Hardening. J. S. Koehler. *Physical Review,* ser. 2, v. 86, Apr. 1, 1952, p. 52-59.

Theoretical study mainly concerned with source-hardening. Comparison of theory and experiment for Al single crystals. Graphs and diagrams. (Q24, Al)

451-Q. Note on Embrittlement From Alkaline Tin Plating. C. A. Zapffe and M. E. Haslem. *Plating,* v. 39, May 1952, p. 468-469, 485.

Results for stainless and carbon steel in two sodium stannate baths. (Q23, L17, CN, Sn)

452-Q. Properties of Materials and Engineering Uses of Cast Metals. R. W. Bailey. *Proceedings of the Institute of British Foundrymen,* v. 44, 1951, p. A23-A31.

Previously abstracted from *Foundry Trade Journal;* see item 393-Q, 1951. (Q general, E general, CI, Cu)

453-Q. The Elastic Stability of Bent I-Section Beams. J. F. Davidson. *Proceedings of the Royal Society,* ser. A, v. 212, p. 80-95.

When made into extruded girders, Al is subject to instability, because of its low modulus and of the thin-walled sections which can be produced. Experimental and theoretical investigation of the instability of such girders. (Q21, Al)

454-Q. Improved Method for Estimating Fatigue Life of Bevel and Hypoid Gears. Wells Coleman. *SAE Quarterly Transactions,* v. 6, Apr. 1952, p. 314-331.

A graph is plotted using calculated stress and number of cycles to failure resulting from extensive bending-fatigue tests on both bevel and hypoid gears. Fatigue life of new gear designs may be estimated. Graphs, formulas, and diagrams. (Q7, ST)

455-Q. The Strength of Metals. E. N. da C. Andrade. *Times Review of the Progress of Science,* Autumn 1951, p. 1-3.

Brief discussion of strength metals in general, in terms of recent laboratory studies on microstructure. (Q23, M27)

456-Q. Determination of Plate Compressive Strengths at Elevated Temperatures. George J. Heimerl and William M. Roberts. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 251-256. (Technical Report 960.)

Results of local-instability tests of H-section plate assemblies and compressive stress-strain tests of extruded 75S-T6 Al alloy, obtained to determine flat-plate compressive strengths under stabilized elevated-temperature conditions, are given for temperatures up to 600° F. They show that methods available for calculating critical compressive stress at room temperature can also be used at elevated temperatures if the applicable compressive stress-strain curve for the material is given. (Q28, Al)

457-Q. Elastic and Plastic Buckling of Simply Supported Solid-Core Sandwich Plates in Compression. Paul Seide and Elbridge Z. Stowell. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 357-366. (Technical Report 967.)

Charts are presented for plates having face materials of 24S-T3 Al alloy, 75S-T6 Alclad Al alloy, and stainless steel. Comparison of computed and experimental buckling stresses. (Q28, Al, SS)

458-Q. Fundamental Effects of Aging on Creep Properties of Solution-Treated Low-Carbon N-155 Alloy. D. N. Frey, J. W. Freeman, and A. E. White. "Thirty-Sixth Annual Report of the National Advisory Committee for Aeronautics, 1950", p. 939-968. (Technical Report 1001.)

Method for investigating fundamental mechanisms by which processing, heat treatment, and chemical composition control the properties of alloys at high temperatures. This method uses metallographic examination—both optical and electronic; studies of X-ray diffraction-line widths, intensities, and lattice parameters; and hardness surveys. Mechanical properties at high temperatures are then measured and correlated with structural conditions. 13 ref. (Q3, M21, N7, SG-h)

459-Q. Copper Alloys With Improved Mechanical Properties and Electrical Conductivity. (In Czech.) Ferd. Kralik. *Hutnické Listy,* v. 7, Feb. 1952, p. 71-72.

Properties of various Cu-Cd, Cu-Ag-Cd, Cu-Cr, Cu-Ni-Si, Cu-Be, and Cu-Ag alloys. (Q general, P15, Cu)

460-Q. Contribution to the Study of the Resistance of Unalloyed Carbon Steel in the Case of Hydrostatic Deformation. (In French.) H. B. Böhler and E. H. Schulz. *Métaux: Corrosion—Industries,* v. 27, Feb. 1952, p. 49-53.

Cohesive strength of steel as a function of carbon content, and the influence of rather high temperatures on this property. Tables and graphs. 12 ref. (Q23, CN)

461-Q. Some Factors Affecting the Creep Resistance of Heat Resistant Austenitic Alloys. (In French.) Xavier Wache. *Métaux: Corrosion—Industries,* v. 27, Feb. 1952, p. 56-68.

Results of thermomagnetic analysis of carburized austenitic steels and of physicothermal analysis of austenites hardened by addition of Ti and Al. Charts, micrographs, and tables. (Q3, SS)

462-Q. Considerations on Creep. (In French.) A. Fotiadi. *Métaux: Corro-*

sion—Industries, v. 27, Feb. 1952, p. 69-74.

Creep of metals at low temperatures, and the mechanical properties of refractory alloys with regard to deformation and cracking, plastic deformations, superposition and repetition of strains, and resistance of refractory alloys to various loads. (Q3, SG-h)

463-Q. Effect of Heat Treatment on the Properties of Drawn Steel Wires. (In German.) Hermann Wedl. *Berg- und Hüttenmännische Monatshefte der Montanistischen Hochschule in Leoben,* v. 97, Mar. 1952, p. 51-58.

Effect of patenting and annealing on mechanical properties of five different low-Cr steels. Tables, graphs, and photomicrographs. 16 ref. (Q general, J23, J25, AY)

464-Q. Origin and Prevention of Stress Patterns on German Silver and Brass. (In German.) Richard Ergang and Stefan Welz. *Zeitschrift für Metallkunde,* v. 43, Feb. 1952, p. 45-49.

The behavior of German silver and brass is shown to be analogous to that of steel. Data are charted; micrographs. (Q25, Cu)

465-Q. Significance of Dependence of Work Hardening Curves of Aluminum Monocrystals on Orientation. (In German.) P. Haasen and G. Leibfried. *Zeitschrift für Physik,* v. 131, No. 4, 1952, p. 538-543.

Strength increase is ascribed to effective shear stresses along slip planes which prevent slipping in the regular slip system. Graphs and tables. 12 ref. (Q24, Al)

466-Q. Measurement of Residual Stresses in Rods and Tubes by Means of Expansion Strips. (In German.) Hans Bühler and Walter Schreiber. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, Mar. 11, 1952, p. 216-218.

Use and advantages as compared to mechanical expansion meters. Details of the measuring process; data are tabulated and charted. (Q25)

467-Q. Bending as a Test Method for Cast Aluminum Alloys. (In Italian.) F. Gatto. *Alluminio,* v. 21, Jan. 1952, p. 15-25.

Application of static bend tests. Calculations, tables, diagrams, and graphs. (Q5, Al)

468-Q. Bend Tests During Gas Pressure Welding of Tubes. (In Russian.) S. M. Skorodzievskii. *Avtogennoe Delo,* v. 22, Oct. 1951, p. 22-23.

Tests were made on two lots of butt welded steel tubes. Tables and graphs. (Q5, K2, CN)

469-Q. Brittle Fracture of Metals. (In Russian.) G. V. Uzhik. *Izvestiia Akademii Nauk SSSR,* Section of Technical Sciences, Sept. 1951, p. 1390-1414.

An answer to comments by N. N. Davidenkov on a previous article by the author. Stresses in notched bars and similar questions are discussed. 30 ref. (Q26)

470-Q Discussion of Work of G. V. Uzhik in the Field of Problems of Strength and Plasticity. Concerning the Paper by V. I. Kudriavtsev, "Dependence Between Uzhik's Resistance to Fracture". (In Russian.) G. V. Uzhik. *Izvestiia Akademii Nauk SSSR,* Section of Technical Sciences, Oct. 1951, p. 1567-1572.

The authors answer to Kudriavtsev's criticisms. Data are tabulated. (Q23)

471-Q. Concerning N. P. Shchapov's Letter. (In Russian.) G. V. Uzhik. *Izvestiia Akademii Nauk SSSR,* Section of Technical Sciences, Oct. 1951, p. 1574-1578.

Answer to Shchapov's criticism of the author's theory of strength. (Q23)

472-Q. The Mechanism of Fatigue. P. Litherland Teed. *Aeroplane,* v. 82, Apr. 25, 1952, p. 484-486, 487.

Reviews research since 1849. Metallic structure, intercrystalline boundaries, nonuniform distribution of stress, plastic flow, and some experimental results. 10 ref. (Q7)

473-Q. The Elastic Constants of Nickel. J. R. Neighbours, F. W. Bratten, and Charles S. Smith. *Journal of Applied Physics,* v. 23, Apr. 1952, p. 389-393.

Determined by the pulsed ultrasonic method. Wave velocity measurements on four Ni single crystals of general orientation, which were magnetically saturated, were combined by the approximation method. Tables and graphs. 12 ref. (Q21, Ni)

474-Q. Deformation and Fracturing of Thick-Walled Steel Cylinders Under Explosive Attack. John Pearson and John S. Rinehart. *Journal of Applied Physics,* v. 23, Apr. 1952, p. 434-441.

Cylinders were internally loaded by explosive charges. They were made of 1020 steel with wall thickness range ½ to 4 in. Microstructure analysis of fragments and strain measurements. Graphs, photographs, and photomicrographs. 20 ref. (Q26, M27, CN)

475-Q. Elastic Constants of Beta-Brass Single Crystals. Robert A. Artman and Donald O. Thompson. *Journal of Applied Physics,* v. 23, Apr.

1952, p. 470-474.

A study showing dependence of elastic constants upon composition. Moduli for different compositions may be obtained by use of a linear interpolation in terms of the atomic ratio of Cu to Zn. Results of bending - torsion measurements and agreement between measured and calculated values. Graphs, diagrams, and tables. 13 ref. (Q21, Cu)

476-Q. Temperature Dependence of Young's Modulus and Internal Friction of Single Crystals of Beta-Brass. Robert A. Artman. *Journal of Applied Physics,* v. 23, Apr. 1952, p. 475-482.

A study using a composite piezoelectric oscillator. Modulus measurements were made in the range 25-480° C. and internal friction at 21 and 42 kc. per sec. from room temperature to above the critical temperature of order-disorder. Effects of inclusions on the α-phase. Graphs, table, and photomicrograph. 13 ref. (Q22, Cu)

477-Q. Stress-Strain Relationship of a High-Tensile Weldable Structural Steel. D. W. Smith, J. G. Whitman, and C. L. M. Cottrell. *Metallurgia,* v. 45, Apr. 1952, p. 169-172.

Investigation, up to 0.3% proof stress, of a low-carbon, Mn-Mo steel being considered for use in construction of a prefabricated transportable bridge. Data for as-rolled and heat treated conditions. Microstructure, tables and graphs. (Q27, M27, AY)

478-Q. Progress in Hardness and Micro-Hardness Testing in 1951. *Metallurgia,* v. 45, Apr. 1952, p. 213-214.

A brief account based on a section of "The Diamond Tool Industry in 1951" published by the Industrial Diamond Information Bureau. 38 ref. (Q29)

479-Q. Some Problems in the Fabrication of N-155 Alloy. Hiram Brown. *Metal Progress,* v. 61, May 1952, p. 67-72.

Their solution as encountered in early usage of this material. Includes mechanical properties, surface defects, and variations in heat treatment. Tables and photomicrographs. (Q general, SS, SG-g, h)

480-Q. Grain Displacement in Metal Stressed Below Elastic Limit. Norman P. Goss. *Metal Progress,* v. 61, May 1952, p. 87-91.

A study by X-ray diffraction methods of movements within the mosaic substructure of coarse-grained metal under moderate stress. Materials were 3% Si steel and high purity annealed Fe. (Q24, AY, Fe)

481-Q. High Yield of Weld Metal. R. A. Huseby. *Metal Progress,* v. 61, May 1952, p. 96.

Brief note comparing tensile data for test pieces cut from a pressure vessel made from Type 347 plate and SW157 welds. (Q27, SS)

482-Q. Wrought Alloys of Magnesium-Misch Metal. *Metal Progress,* v. 61, May 1952, p. 140, 142. (Condensed from "Development of Magnesium-Cerium Forged Alloys For Elevated-Temperature Service." K. Grube, R. Kaiser, L. W. Eastwood, C. M. Schwartz, and H. C. Cross.)

Previously abstracted from *National Advisory Committee for Aeronautics,* Technical Note 2325. See item 250-Q, 1951. (Q3, M27, Mg)

483-Q. Internal Friction and Aging of Steel. *Metal Progress,* v. 61, May 1952, p. 144. (Condensed from "Internal Friction in Iron and Steel". J. D. Fast and L. J. Dijkstra.)

Previously abstracted from *Philips Technical Review.* See item 274-Q, 1952. (Q22, Q8, N7, Fe, ST)

484-Q. Creep in Copper. *Metal Progress,* v. 61, May 1952, p. 162, 164, 166. (Condensed from "The Creep and Softening Properties of Copper for Alternator Rotor Windings". N. D. Benson, J. McKeown, and D. N. Mends.)

Previously abstracted from *Journal of the Institute of Metals.* See item 10-Q, 1952. (Q3. Cu)

485-Q. Wear on Cemented Carbide Tools. *Metal Progress,* v. 61, May 1952, p. 186, 188. (Condensed from "Some Factors Affecting Wear on Cemented Carbide Tools", E. M. Trent.)

Previously abstracted from *Engineer.* See item 64-Q, 1952. (Q9, C-n)

486-Q. A Theoretical Estimate of the Effect of Radiation on the Elastic Constants of Simple Metals. G. J. Dienes. *Physical Review,* ser. 2, v. 86, Apr. 15, 1952, p. 228-234.

An approximate theoretical treatment of change in elastic constants of simple metals caused by the presence of a given small fraction of interstitial atoms and vacancies. Elastic constants are calculated from interatomic potentials employing a simple exponential function for Cu and a Morse function for Na. Tables and graphs. 18 ref. (Q21, Cu, Na)

487-Q. Fatigue Properties of Cast Aluminum Alloys. R. L. Templin, F. M. Howell, and J. O. Lyst. *Product Engineering,* v. 23, May 1952, p. 119-123.

Extensive tests on 28 alloys cast in sand molds and 17 alloys cast in permanent molds reveal there are

no pronounced differences in their fatigue strengths. Table lists nominal compositions and tensile properties for fatigue-test conditions. Wide ranges of tensile properties result from heat treatment. These differences in static property values are not reflected in the fatigue strengths of the alloys. Graphs. (Q7, A1)

488-Q. Accelerated Wear Tests for Diesel Engines. *SAE Journal,* v. 60, May 1952, p. 50-53. (Based on "Evaluation of Wear in Diesel Engines by Means of Accelerated Tests" by Robert E. Kennemer.)

A series of laboratory tests including the following types: abrasive wear tests, corrosive wear tests, and scuffing tests, performed in multicylinder engines with split setups used to get accurate comparative data. Graphs. (Q9, R11)

489-Q. French Position With Respect to Mechanical Tests for Acceptance of Gray Cast Iron Pieces. (In French.) Etienne Doat. *Fonderie,* Mar. 1952, p. 2846-2850.

Tables and diagrams. (Q general, CI)

490-Q. Hardness and Strength Properties of Metal. (In French.) D. Tabor. *Revue de Métallurgie,* v. 49, Mar. 1952, p. 208-210.

A brief theoretical discussion of the relation between the elastic limit and the hardness of metal. Tables and graphs. (Q29, Q21)

491-Q. Fatigue-Test Programming. Variable-Amplitude Rotating Bend Tests. (In Italian.) Luigi Locati. *Metallurgia Italiana,* v. 44, Apr. 1952, p. 135-144.

Variation in stresses imposed on the samples was found to differ greatly from that expected on the basis of the sine-wave function. A new apparatus by which rotating bend tests with stresses varying with time can be carried out according to a pre-established program. Results for a series of carbon, low-alloy, and stainless steels, and for an Al-base alloy. 22 ref. (Q7, ST, A1)

492-Q. The Problem of the Number of Cycles During Fatigue Testing of Welded Joints. (In Russian.) V. I. Shabalin. *Avtogennoe Delo,* v. 22, Nov. 1951, p. 4-5.

Determination of the number of cycles of stress application necessary to indicate the fatigue strength of welds, particularly in steel of the "Cromansil" type. Tables, graphs, and photomicrographs. (Q7, AY)

493-Q. D.T.D. 424—The Versatile Light Alloy. A. P. Fenn. *Proceedings of the Institute of British Foundrymen,* v. 44, 1951, p. A183-A189; disc., p. A190-A197.

Previously abstracted from *Institute of British Foundrymen;* item 501-Q, 1951. (Q general, E11, E13, Al)

494-Q. (Book) **The Elevated-Temperature Properties of Stainless Steels.** Ward F. Simmons and Howard C. Cross. 120 pages. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. $4.00.

A graphical summary of high-temperature data for commercially produced stainless steels. The book will aid in establishing stress values and code requirements, and in equipment design. (Q general, SS)

495-Q. (Book) **Finite Deformation of an Elastic Solid.** Francis D. Murnaghan. 140 pages, 1951. John Wiley and Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $4.00.

Considers squares and higher powers of the strain components in the theory of elasticity. Application of the theory to larger deformations and stresses than those allowed by the classical theory. Matrixes are used methodically with a preliminary explanation in the first chapter. Topics of special interest are the importance of non-isotropic media and the problem of deformation under extreme pressures. (Q21)

496-Q. Uses of Titanium in Turbojets. H. H. Hanink. *Automotive Industries,* v. 106, May 15, 1952, p. 90, 92, 96. (A condensation.)

Refers to components common to all engine types, since security regulations do not permit discussion of the internal parts of any particular engine. Comparative mechanical properties of potential compressor-disk materials vs. temperature are charted. (Q general, T25, Ti, SG-h)

497-Q. Rosslyn Metal Undergoes High Temperature Tests. *Automotive Industries,* v. 106, May 15, 1952, p. 102, 105-106.

Rosslyn Metal, a development of American Cladmetals Co., is a composite copper-stainless steel sheet material said to have the high thermal conductivity. Its use in jet-engine parts is being evaluated by Ryan Aeronautical Co. (Q general, P11, T24, Cu, SS, SG-h)

498-Q. The Harmful Influence of Some Residual Elements in Magnesium-Treated Nodular Cast Irons and Their Neutralization By Cerium. H.

Morrogh. *British Cast Iron Research Association Journal of Research and Development,* v. 4, Apr. 1952, p. 292-314.

The harmful effects of Ti, Pb, Sb, Bi, Al, and Cu in Mg-treated nodular cast irons. Influence of Sn and As. Tabular data. 12 pages of photomicrographs. (Q general, M27, CI)

499-Q. Absolute Hardness Scale. J. Murkes. *Engineers' Digest,* v. 13, Apr. 1952, p. 112-114. (Translated and condensed from *Teknisk Tidskrift,* v. 82, Jan. 15, 1952, p. 37-40.)

Critically considers known methods of hardness determination, in particular that of Chrustiov and its applicability. Graphs and tables. (Q29)

500-Q. Rare Earths Boost Creep Resistance of Mg-Zr Alloys. W. G. Patton. *Iron Age,* v. 169, May 22, 1952, p. 134-136.

By adding 2-4% rare earths to Mg-Zr alloys, Dow Chemical has produced new alloys with outstanding high-temperature properties. (Q3, Mg)

501-Q. The Dynamic Theory of Yield. K. E. Puttick and M. W. Thring. *Iron & Steel,* v. 25, May 1952, p. 155-159.

Reviews theories proposed. Recent work on tensile and compressive impact tests, brittle fracture, and the onset of twinning, in light of the theory. Graphs. 25 ref. (Q23)

502-Q. Internal Friction; Influence of Carbon and Nitrogen in Iron and Steel. J. D. Fast and L. J. Dijkstra. *Iron & Steel,* v. 25, May 1952, p. 165-169, 188.

Previously abstracted under similar title, from *Philips Technical Review.* See item 274-Q, 1952. (Q22, Q8, N7, Fe, ST)

503-Q. Some Current Views on the Mechanism of Creep. L. M. T. Hopkin. *Journal of the Birmingham Metallurgical Society,* v. 32, Mar. 1952, p. 15-33.

A critical survey illustrated by graphs and micrographs taken from the literature. 34 ref. (Q3)

504-Q. Repeated Load Tests on Welded and Restrained Steels. Sadun S. Tör, Jan M. Ruzek, and Robert D. Stout. *Welding Journal,* v. 31, May 1952, p. 238s-246s.

Development of test specimens and procedure and of test equipment. Repeated-load machine includes SR-4 strain gages for calibration of strains. Al-killed A-201 and rimmed A-285 steel plates ⅝ in. thick were tested after various heat treating, bead welding, or tensile straining pretreatments, at room temperature and at 500° F. Origin of cracking. Micrographs, diagrams, illustrations, and graphs. (Q27, K general, CN)

505-Q. The Effect of Quench-Aging on the Notch Sensitivity of Steel. J. R. Low, Jr. *Welding Journal,* v. 31, May 1952, p. 253s-256s.

Charpy impact-test specimens of a semikilled 1020 steel were quenched from 690° C. and aged at room temperature for periods to three years. Transition temperature changes were followed. Suggests that quench-aging is responsible for the usual brittle zone adjacent to welds in 1020 steel and that a low-temperature post-heat treatment similar to that used for overaging should improve the low-temperature ductility of welded structures made of this and similar grades of steel. Graphs. (Q23, J27, CN)

506-Q. Dimensional Effects in Fracture. *Welding Journal,* v. 31, May 1952, p. 271s-272s.

Discussion by Wendell P. Roop of above paper by C. W. MacGregor and N. Grossman, (Jan. 1951 issue; item 166-Q, 1952.) Includes author's reply. (Q26, TS)

507-Q. High-Temperature Materials: Tests Used as Criteria of Service Behaviour. (In English.) L. B. Pfeil. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 18, Mar. 1952, p. 88-97.

Discussion based on critical evaluation of the literature and the author's experiences. Creep resistance, fatigue strength, corrosion resistance, and thermal shock resistance, said to be the most important properties for high-temperature service. Emphasis is on behavior of Nimonic 80, a high-Ni alloy. 25 ref. (Q general, R general, Ni)

508-Q. Copper and Copper Alloys. 7. Nickel-Alloyed Aluminum Bronzes. (In Dutch.) W. G. R. De Jager. *Metalen,* v. 7, Mar. 15, 1952, p. 83-89; Apr. 15, 1952, p. 128-129.

Mechanical properties of Al bronzes alloyed with 0-5.5% Ni are discussed, charted, and tabulated. (Q general, Cu)

509-Q. The Structure of Metals After Plastic Deformation. (In French.) Paul Bastien. *Metaux: Corrosion—Industries,* v. 27, Mar. 1952, p. 95-106.

Investigated from the macrographic, micrographic, and crystalline aspect. Influence of cold and hot working on mechanical characteristics of ferrous and nonferrous metals. Micrographs, tables, and diagrams. 14 ref. (Q24, M26, M27, M28)

510-Q. Creep of Metals and Methods for Its Measurement. (In French.)

E. Morlet. *Metaux: Corrosion—Industries,* v. 27, Mar. 1952, p. 107-118.

The different types of deformations of metal bars subjected to traction; deformations of metals and alloys as a function of weather and temperature; and influence of various factors on resistance to creep. Includes diagrams and charts. 17 ref. (Q3)

511-Q. Research on the Exhaust Valves of Airplane Engines. (In French.) E. H. Bucknall and F. A. Ball. *Revue de Métallurgie,* Apr. 1952, p. 249-261; disc., p. 261.

Research during the war at Mond Nickel Co., England, on the improvement of materials and methods of production of airplane exhaust valves. Micrographs show crack formation and microstructure under various circumstances and in different materials, especially 80-20 Ni-Cr alloys and an alloy steel containing 0.35-0.50% C, 1.0-2.5% Si, 1.50% Mn max., 10% Ni min., 12.0-16% Cr, and 2.0-4.0% W. An alloy of 74% Ni, 20% Cr, and 6% Fe was also studied, as well as effects of 1% Cb on it. Mechanical properties (shock resistance and hardness) were studied. Data are tabulated. (Q general, M27, SS, Ni)

512-Q. Contribution to the Study of the Wear of Cutting Tools. (In French.) F. Eugene. *Revue de Métallurgie,* Apr. 1952, p. 267-282; disc., p. 282.

Various factors were investigated, particularly the influence of sharpening angle and of cutting rate. Method for measuring the wear resistance of cutting tools. Results obtained with various toolsteels. Micrographs, tables, and diagrams. (Q9, G17, SG-j, TS)

513-Q. Tin and Arsenic in Annealed Alloy Structural Steels. (In German.) H. Krainer and W. Daum. *Berg- und Hüttenmännische Monatshefte der Montanistischen Hochschule in Leoben,* v. 97, Apr. 1952, p. 67-72.

Effects of Sn contents up to 0.4% and of As contents up to 0.5% on hardness and notch-impact toughness of 15 different steels under different heat treating and quenching conditions. Results show that As and Sn have undesirable effects. Photographs, tables, and graphs. 14 ref. (Q29, Q6, AY)

514-Q. An Impact-Notch Notch-Impact Sample. (In German.) R. Mitsche. *Berg- und Hüttenmännische Monatshefte der Montanistischen Hochschule in Leoben,* v. 97, Apr. 1952, p. 72-73.

A specimen for testing tendency to brittle fracture made by forming the notch by impact with a special device on the Charpy hammer. (Q6)

515-Q. Influence of Mechanical Polishing and Electropolishing on the Micro and Macrohardness of Metals. (In German.) Th. Geiger. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 18, Feb. 1952, p. 41-46.

Experiments applied to 18-8 austenitic steel, electrolytic iron, and carbon steel. The tests show that both mechanical and electrolytic polishing result in considerable surface hardening, particularly of austenitic steels. Micrographs and radiographs confirm results of the hardness tests. Graphs and tables. (Q29, L10, L13, Fe, CN, SS)

516-Q. Creep-Stress Tests on Malleable Anticorodal B, Age-Hardened Avional-23, and Soft Peraluman at 26, 100, and 130° C. (In German.) E. von Burg. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 18, Mar. 1952, p. 73-86.

Includes investigation of creep-stress behavior of notched bars. Shows that creep strength of light metals is greatly affected by production conditions, so that same producer may deliver at different times, a given light metal with different creep resistances. Graphs and tables. (Q3, Al)

517-Q. Comparative Representation of the Properties of Cemented Carbide Alloy. (In German.) Carl Ballhausen. *Stahl und Eisen,* v. 72, Apr. 24, 1952, p. 489-492.

Graphical representation from which a standard designation system for the carbide alloys is developed. Mechanical and physical properties are tabulated. (Q general, P general, C-n)

518-Q. Banding of Steel. (In Swedish.) S. Baecksirom. *Jernkontorets Annaler,* v. 136, No. 1, 1952, p. 9-20.

Reviews the above on the basis of the literature, in particular the causes of band structure, and some factors which influence formation of banding, lamination, and similar structures. 39 ref. (Q24, ST)

519-Q. New Techniques For Measuring Forces and Wear in Telephone Switching Apparatus. Warren P. Mason and Samuel D. White. *Bell System Technical Journal,* v. 31, May 1952, p. 469-503.

Several new techniques devised for producing and controlling normal and tangential motions for wear studies. The forces are measured by inserting small barium titanate ce-

ramics between points of application of the forces and observing the voltages generated on a cathode-ray oscillograph. Quantitative measurements of wear were made for a variety of materials, and it was shown that materials with a large elastic strain limit wear (plastics and rubber) better than materials with a small elastic strain limit (metals or glass) even though the latter have a higher yield stress. Brass and stainless steel were the metals studied. Graphs, diagrams, tables, and illustrations. 16 ref. (Q9, Cu, SS)

520-Q. Principal Strains in Cable Sheaths and Other Buckled Surfaces. I. L. Hopkins. *Bell System Technical Journal,* v. 31, May 1952, p. 523-529.

Equations are developed for rigorous determination of magnitudes and directions of principal strains in plastic deformation, by means of measurements of rectangular strain rosettes. Application to study of telephone-cable sheath. (Q25)

521-Q. The Bending and Twisting of Anisotropic Plates. R. F. S. Hearmon and E. H. Adams. *British Journal of Applied Physics,* v. 3, May 1952, p. 150-156.

The theory of the deflection of anisotropic plates under bending and twisting loads. Experimental methods for investigating the theory were tested on Al, brass, and mild-steel plates. The results of experiments on plywood cut at various angles to the grain are found to conform with the theory. Apparatus, diagrams and tables. (Q5, Q1, Al, Cu, CN)

522-Q. Low-Stress Torsional Creep Properties of Pure Aluminium. W. Betteridge. *Bulletin of the Institute of Metals,* May 1952, p. 76-77. (Bound with *Journal of the Institute of Metals,* v. 80, 1952.)

A study in reference to effects of cold work and annealing on creep behavior. Torsion-creep curves were determined on super-purity Al using ¼-in. diameter test rods at constant stress at 200° C. Additional tests were made on single crystals. Graph and table. (Q3, Al)

523-Q. The Flow of Metals. E. N. da C. Andrade. *Engineer,* v. 193, May 16, 1952, p. 658-659; May 23, 1952, p. 692-693.

Sixth Hatfield Memorial Lecture reviews knowledge about creep of metals under stress. Creep behavior of Pb, Sn, Cu, Fe, Cd, solid Hg and many other materials is very similar if allowance is made for temperature, and can be expressed by a simple equation. The physical mechanism of creep. 18 ref. (Q3, Pb, Sn, Cu, Fe, Cd, Hg)

524-Q. War on Wear. H. Blok. *Engineering,* v. 173, May 9, 1952, p. 594; May 16, 1952, p. 625-626.

A general discussion of fundamental principles, types of wear, and means of combating it. (Q9)

525-Q. The Size Effect in Fatigue of Plain and Notched Steel Specimens Loaded Under Reversed Direct Stress. C. E. Phillips and R. B. Heywood. *Institution of Mechanical Engineers, Proceedings* (Applied Mechanics Div.), v. 176, W. E. P. 65, 1951, p. 113-124; disc., p. 130-140.

Fatigue strength was determined for specimens of various diameters in the range of 0.19-2.4 in. for a 25-ton mild steel and a 65-ton, 2½% Ni-Cr steel. No intrinsic size effect was observed with plain specimens, but size effects were found for notched specimens. Graphs, tables, photographs, and micrographs. (Q7, CN, AY)

526-Q. Some Fatigue Tests on Aluminium-Alloy and Mild-Steel Sheet, With and Without Drilled Holes. C. E. Phillips and A. J. Fenner. *Institution of Mechanical Engineers, Proceedings* (Applied Mechanics Div.), v. 165, W. E. P. 65, 1951, p. 125-129; disc., p. 130-140.

Tests under pulsating direct stress of panels approximately 0.1 in. thick and up to 12 in. maximum width. Size effects occur for both panel and hole size. Tables, diagrams, graphs, and photographs. (Q7, Al, CN)

527-Q. Cold Working; Softening of Overstrained Metals. N. H. Polakowski. *Iron & Steel,* v. 25, May 17, 1952, p. 225-228; disc., p. 251-256.

Previously abstracted under similar title from *Journal of the Iron and Steel Institute,* item 154-Q, 1952. (Q24, N5, Cu, Ni, Al, ST)

528-Q. Low-Alloy Steels; Effect of Hydrogen on Their Properties. J. D. Hobson and C. Sykes. *Iron & Steel,* v. 25, May 17, 1952, p. 246-251; disc., p. 261-264.

Previously abstracted under similar title from *Journal of the Iron and Steel Institute,* item 67-Q, 1952. (Q23, AY)

529-Q. A Study of Some Factors Influencing the Young's Modulus of Solid Solutions. A. D. N. Smith. *Journal of the Institute of Metals,* v. 80, May 1952, p. 477-482.

Values for a series of binary solid solutions of Cu with Zn, Ga, Ge, Si,

and As, and of Ag with Cd, In, and Sn were measured dynamically at room temperature. In agreement with earlier work, it was found that, in any one system, the modulus decreases approximately linearly with atomic percentage of the solute, although rate of decrease differs for each system. This rate of decrease depends not only on difference in atomic radii of the solute and solvent, but also on difference in valency between the two constituents. 17 ref. (Q21)

530-Q. Residual Stresses in Chill-Cast and Continuously Cast Aluminium Alloy Billets. R. A. Dodd. *Journal of the Institute of Metals,* v. 80, May 1952, p. 493-500.

Effect of the following variables on the magnitude of internal stresses in chill-cast Al-alloy billets was studied: length of billet, diameter of billet, pouring temperature, and rate of flow of cooling water. Stresses were determined mechanically by Sach's boring method and shown to be independent of billet dimensions and of rate of flow of cooling water, but to increase approximately linearly with increase in pouring temperature. Effect of pouring temperature and rate of pouring on residual stresses in semicontinuously cast billets was also studied. Graph and tables. (Q25, Al)

531-Q. Creep Processes in Coarse-Grained Aluminium. D. McLean. *Journal of the Institute of Metals,* v. 80, May 1952, p. 507-519.

A specimen of super-pure Al was extended under a constant load of ½ ton per sq. in. at 200° C. to fracture, which occurred at 65% extension in 850 hr. Observations were made of slip-band and grain-boundary movements which were measured, mainly by means of an interference microscope, and their respective contributions to the creep extension calculated. Tables and photomicrographs. 23 ref. (Q3, Q24, Al)

532-Q. Electron-Microscopic Studies of Slip in Aluminium During Creep. J. Trotter. *Journal of the Institute of Metals,* v. 80, May 1952, p. 521-523.

Slow deformation of a specimen of 99.98% Al at 200° C. was studied by means of the electron microscope, using the plastic-replica process. Shows that slip zones do not consist of bundles of long parallel slip lamellae of the type found by Heidenreich and Shockley in room-temperature deformation, but of intimate segments of primary and cross-slip. Electron micrographs. 10 ref. (Q3, Q24, Al)

533-Q. Compression Texture of Iodide Titanium. D. N. Williams and D. S. Eppelsheimer. *Journal of Metals,* v. 4, June, 1952: *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 615-618.

Found to consist of a (0001) texture rotated 15-30° from the axis of compression. As the amount of reduction increases, the angle of rotation decreases. (Q24, Ti)

534-Q. Observations of Creep of the Grain Boundary in High Purity Aluminum. H. C. Chang and N. J. Grant. *Journal of Metals,* v. 4, June, 1952: *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 619-625.

Experimental observations of behavior of the grain boundaries and their effect on deformation in the grains. High-purity Al was used to avoid complications. Micrographs. 16 ref. (Q3, Al)

535-Q. Effect of Zirconium on Magnesium-Thorium and Magnesium-Thorium-Cerium Alloys. T. E. Leontis. *Journal of Metals,* v. 4, June, 1952: *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 633-642.

Addition of Zr to sand-cast Mg-Th alloys effects a marked decrease in grain size which is accompanied by a significant increase in mechanical properties over the entire range of Th content investigated. The beneficial effect is maintained at temperatures up to 700° F. In addition, the alloys exhibit exceptionally high creep resistance up to 600° F. Ce was found to be a desirable addition to Mg-Th-Zr alloys. Extensive tables, graphs, and micrographs. 13 ref. (Q general, M27, Mg)

536-Q. Effect of Prior Strain at Low Temperatures on the Properties of Some Close-Packed Metals at Room Temperature. W. C. Ellis and E. S. Greiner. *Journal of Metals,* v. 4, June, 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 648-650.

As temperature of deformation is lowered, flow strength and ultimate strength of a number of metals and alloys at room temperature are increased. Likewise, in materials in which lattice scattering predominates, electrical conductivity is decreased to a greater degree as temperature of deformation is lowered. Data for a number of commercial metals and alloys rolled at —195° C. illustrate the increase in strength properties that may be obtained by such treatment. (Q24, P15)

537-Q. Deformation of Zinc Bicrystals by Thermal Ratcheting. J. E. Burke and Anna M. Turkalo. *Journal of Metals,* v. 4, June, 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 651-656.

Phenomenon of "thermal fatigue" proposed by Boas and Honeycombe. The possibility was investigated that an additional mechanism might cause plastic deformation during thermal cycling—a "thermal ratchet" that depends upon a combination of grain-boundary flow to relax the stress that develops between differently oriented grains upon raising the temperature, and transcrystalline slip to relax the oppositely directed stress which develops on lowering the temperature. Theoretical analysis is followed by details of experiments on Zn bicrystals. (Q24, Zn)

538-Q. Influence of Nitrogen on the Notch Toughness of Heat-Treated 0.3-Percent-Carbon Steels at Low Temperatures. Glenn W. Geil, Nesbit L. Carwile, and Thomas G. Digges. *Journal of Research of the National Bureau of Standards,* v. 48, Mar. 1952, p. 193-200.

Charpy impact tests were made at temperatures ranging from −196 to +100° C. on fully hardened and tempered specimens of 0.3% carbon steels with variable N_2 contents. Al-treated steels had considerably lower transition temperatures than those of steels not treated with Al. Graphs. 38 ref. (Q23, CN)

539-Q. Hydrogen Embrittlement & Hair-Line Cracks in Steels. A. B. Chatterjea and B. R. Nijhawan. *Journal of Scientific & Industrial Research,* v. 11A, Apr. 1952, p. 158-161.

Literature review. 45 ref. (Q23, ST)

540-Q. A Calibrating Device for Impact Testing Machines. G. L. Brown. *Journal of Scientific Instruments,* v. 29, May 1952, p. 161. (Q6)

541-Q. The Influence of Copper, Nickel and Tin on the Hot Working Properties of Mild Steel. G. G. Foster and J. K. Gilchrist. *Metallurgia,* v. 45, May 1952, p. 225-230.

A study on the basis of bend tests carried out at high temperatures. Addition of Ni to Cu-bearing steels results in improved hot working properties, while the addition of Sn to Cu or Cu-Ni steels has the reverse effect. Graphs and photographs. 15 ref. (Q23, Q5, CN)

542-Q. The Development of a Strain or Displacement-Actuated Electronic Trigger for High-Temperature Stress-Relaxation Testing and Other Purposes. D. C. Herbert and D. J. Armstrong. *Metallurgia,* v. 45, May 1952, p. 267-270.

The servo system and its operating instructions. Schematic and wiring diagrams and photographs. (Q25)

543-Q. Influence of Heat-Treatment on the True Tensile Curves for Mild Steel. P. Bastien and C. Winter. *Metal Treatment and Drop Forging,* v. 19, May 1952, p. 213-216. (A translation.)

The effect of heat treatment on the plasticity modulus which characterizes the deep drawing quality of dead soft mild steel. The three steels used contained Ni in the range 0.15-0.17%; Cr, 0.08-0.11% and Cu, 0.15-0.30%. Tables and graphs. (Q27, G4, J general, AY)

544-Q. A Hardness Tester for Small Loads. H. Broschke. *Microtechnic* (English Ed.), v. 6, No. 1, 1952, p. 15-21. (Translated from the German.)

Apparatus known as the "Durimet" is primarily intended for testing very small parts as well as thin layers such as present on surface of case hardened workpieces, foil material, varnishes, plastics, edges and points of turning, milling, and other cutting tools. (Q29)

545-Q. Fatigue Strengths of 14S-T4 Aluminum Alloy Subjected to Biaxial Tensile Stresses. Joseph Marin and W. P. Hughes. *National Advisory Committee for Aeronautics,* Technical Note 2704, June 1952, 24 pages.

Effect upon fatigue strength of varying ratio of biaxial stresses was studied. The biaxial fatigue stresses were produced by applying simultaneously a pulsating internal pressure and a fluctuating axial tensile load to a thin-walled tubular specimen. Dynamic loads were applied by a specially designed testing machine. Results show that fatigue strength is greatly affected by anisotropy. (Q7, Al)

546-Q. Delayed Fracture of Metals Under Static Load. N. J. Petch and P. Stables. *Nature,* v. 169, May 17, 1952, p. 842-843.

Theory of the delayed fracture and its relationship to the same behavior of glass. Theory of hydrogen embrittlement and results of experiments on tensile strength and shock resistance of H_2-free and H_2-charged iron. (Q27, Q23, Fe)

547-Q. On the Significance of the Limit Load Theorems for an Elastic-Plastic Body. E. H. Lee. *Philosophical Magazine,* ser. 7, v. 43, May 1952, p. 549-560; disc., p. 560-561.

Theoretical and mathematical. Graphs. 11 ref. (Q21, Q23)

548-Q. The Elastic Behaviour of a Crystalline Aggregate. R. Hill. *Proceedings of the Physical Society,* v. 65, sec. A, May 1, 1952, p. 349-354.

Connection between the elastic behavior of an aggregate and a single crystal with special reference to theories of Voigt, Reuss, Huber, and Schmid. Elastic limit under various stress systems was also considered. Illustrated by data on Al, Cu, Au, and α-Fe. 10 ref. (Q21)

549-Q. A Study of Some Impacts Between Metal Bodies by a Piezo-Electric Method. A. W. Crook. *Proceedings of the Royal Society,* ser. A, v. 212, May 7, 1952, p. 377-390.

Continuous measurements of the force throughout impacts between metal cylinders and between a hard sphere and metal flats. The force was measured piezo-electrically. Results agree closely with force-time curves calculated, assuming that deformation is opposed by a constant pressure. Theory. Graphs and tables. 11 ref. (Q6)

550-Q. Nitrogen Content and Low-Temperature Brittleness of Steel. *Technical News Bulletin* (National Bureau of Standards) v. 36, Mar. 1952, p. 46-47.

See abstract of "Influence of Nitrogen on the Notch Toughness at Low Temperatures of Heat-Treated 0.3 Percent Carbon Steel", *Journal of Research of the National Bureau of Standards,* item 538-Q, above. (Q23, CN)

551-Q. F-3 Lead Alloy Cable Sheath —Effect of Bending and Creep on Life. L. F. Hickernell, A. A. Jones, and C. J. Snyder. *Transactions of the American Institute of Electrical Engineers,* v. 70, pt. 2, 1951, p. 1273-1280; disc., p. 1280-1285.

Extensive experimental investigation of mechanical properties of arsenical Pb alloy as compared with other cable-sheath alloys. Graphs, tables, and macrographs. (Q general, Q3, Q5, Pb)

552-Q. A Study of Cold Worked Aluminium by an X-Ray Micro-Beam Technique. (In English.) **I. Measurement of Particle Volume and Misorientations. II. Measurement of Snapes of Spots.** P. B. Hirsch and J. N. Kellar. **III. The Structure of Cold Worked Aluminium.** P. B. Hirsch. *Acta Crystallographica,* v. 5, Mar. 1952, p. 162-165.

X-ray, microbeam, back-reflection photographs permit determination of mean particle size and disorientation, and of their variations with degree of deformation, time after rolling, and purity of specimen. Part II: A method for obtaining, from the shapes of the spots on spottyring photographs, approximate values of physical broadening of the reflections. Part III: Results reported in the two previous installments are discussed in the light of present theories of plastic deformation of metals. 30 ref. (Q24, Al)

553-Q. Soap Film Technique for Solving Torsion Problems. (In English.) Ken Ikeda. *Japan Science Review,* v. 2, Aug. 1951, p. 113-118.

Technique for study of stresses in solids. (Q25)

554-Q. On the Estimation of Properties of Cast Iron by Chill Tests. (In English.) Nobuaki Ogura. *Japan Science Review,* v. 2, Aug. 1951, p. 203-210.

Small, sensitive wedge-shaped test pieces were used in the experiments. Quantitative relations among chill thickness of fracture, chemical composition, and tensile strength were investigated. By application of these comparatively small test pieces, estimation of properties is possible immediately after tapping. Results are charted, tabulated, and discussed. (Q27, E25, CI)

555-Q. The Influence of Gas in Steels. (In French.) A. Kohn. *L'Ossature Métallique,* v. 17, May 1952, p. 236-238.

A review on the basis of the literature, particularly effects on mechanical properties of basic bessemer steel with a low N content. Graphs. 16 ref. (Q general, CN)

556-Q. Large Mechanical Fatigue Test Installation (G.I.M.E.D.) of the Belgian Industrial Association (A.I.B.). (In French.) L. Baes and Y. Verwilst. *L'Ossature Métallique,* v. 17, May 1952, p. 267-276.

Reports on a series of fatigue tests done on large steel beams. Structural details of the equipment, such as its size, capacity, and various testing possibilities. (Q7)

557-Q. Susceptibility of High-Strength Structural Steels to Cracking and Brittle Fracture. (In German.) Erich Folkhard. *Schweissen und Schneiden,* v. 4, May 1952, p. 139-154.

See abstract from *Stahl und Eisen,* item 303-Q, 1951. (Q23, K9, CN)

558-Q. Significance of Wheatstone Bridges for the Measuring Process With Electrical Strain Gages Which Can Be Cemented Onto the Test Specimens. (In German.) A. U. Huggenberger. *Schweizer Archiv für Angewandte Wissenschaft und Technik,* v. 18, Apr. 1952, p. 105-116.

Varying arrangements on the test specimens. Examples of application. Data are extensively tabulated. 11 ref. (Q25)

559-Q. The Influence of Surface Films on the Friction of Solid Bodies. (In German.) F. P. Bowden. *Schweizer Archiv für Angewandte Wissenschaft und Technik,* v. 18, Apr. 1952, p. 116-127.

Recent investigations with respect to friction between metals. Effects of the mechanical properties of the oxide layers, of the lubricant film, and of attack by chemical agents. Tables and diagrams. 17 ref. (Q9)

560-Q. Contribution to Metallographic Investigation of the Hot Shortness of Corroded Platinum Ware. (In German.) Gerhard Neinacher. *Werkstoffe und Korrosion,* v. 3, May-June 1952, p. 192-197.

Polished sections of Pt ware, destroyed by pick-up of As, Bi, P or Si, were examined microscopically in a vacuum up to about 850° C. Eutectic melting processes, which cause the hot shortness, are clarified by the photomicrographs. (Q23, M27, Pt)

561-Q. Microhardness Investigations of Supersaturated Aluminum-Manganese Alloys. (In German.) Helmut Buckle. *Zeitschrift für Metallkunde,* v. 43, Mar. 1952, p. 82-89.

The straightline relationship between load and diameter of impression according to Meyer's exponential law applies only to highly pure metals and phases. A method of measuring the microhardness of the matrix is developed and applied to supersaturated solutions of Al-Mg alloys (3.0-6.7% Mg.) Graphs, tables, and micrographs. 12 ref. (Q29, Al)

562-Q. Theory of the Strength of Materials. (In German.) Kurt Matthaes. *Zeitschrift für Metallkunde,* v. 43, Jan. 1952, p. 11-19; Mar. 1952, p. 90-95.

Theory with particular regard to the elastic behavior of metals. The plastic state, the transition between elasticity and plasticity, and stress-corrosion. Data are tabulated and charted for a large number of pure metals and alloys. 63 ref. (Q21, Q23, R1)

563-Q. Mechanism of Tensile Deformation of Monocrystals. (In German.) Fritz Röhm and Jörg Diehl. *Zeitschrift für Metallkunde,* v. 43, Apr. 1952, p. 126-128.

Attempts to explain a sudden increase in strength properties of cubic-face-centered crystals at a certain point during plastic deformation. Behavior of high-purity Al reported previously is common to this type of crystals. 13 ref. (Q23, Q24, Al)

564-Q. Effect of Temperature and Rate of Deformation on Critical Shear Stress. (In German.) Franz Vitovec. *Zeitschrift für Metallkunde,* v. 43, Apr. 1952, p. 128-130.

Review of literature includes charted data for Sn, Cd, and Al. 14 ref. (Q2, Sn, Cd, Al)

565-Q. The Slip Process and Solidification of Metallic Substances. (In German.) A. Kochenderfer. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, Apr. 1, 1952, p. 267-273.

Literature review. Discusses the process both in mono and polycrystals. Application of the results to technical problems. Schematic diagrams, tables, and graphs. 22 ref. (Q24, N12)

566-Q. Possibilities of Use of Continuous Testing Machines With Oscillating Drives. (In German.) Max Russenberger. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, Apr. 21, 1952, p. 314-318.

A new type testing machine for investigating tensile stress, pressure, bending, and torsion stresses; it can also be used for determining damping, and for measurement of elasticity moduli. Examples illustrate its varied applications. Tables, graphs, diagrams, and photographs. (Q27, Q28, Q5)

567-Q. Thermal Fatigue of Aluminum Single Crystals. (In Russian.) V. I. Arkharov and A. K. Semenova. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Apr. 11, 1952, p. 681-683.

Investigated by cycling specimens between 15° C. and 300, 400, and 500° C. for various lots. X-ray diffraction was used to study the deformations. Includes Laue patterns. (Q7, Al)

568-Q. The Theory of the Development of Twins in Metals, Alloys, and Laminated Crystals. (In Russian.) G. S. Zhdanov. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Apr. 11, 1952, p. 685-688.

A theoretical discussion. 10 ref. (Q24, M27)

569-Q. The Hardness of Transition Zones in Unalloyed and Low-Alloy Steel and Possibilities of Predicting It. (In Swedish.) Tore Norén and Lauri Pietiläinen. *Esab's tidning Svetsaren,* v. 16, Apr. 1952, p. 71-90.

Effect of carbon content and heat treatment on hardness. Numerous graphs, photomicrographs, and tables. (Q29, CN, AY)

570-Q. Mechanical Testing of Solid Materials. Walter Ramberg. *Applied*

Mechanics Reviews, v. 5, June 1952, p. 241-288.

A review. 117 ref. (Q general)

571-Q. A Discussion on Friction. *Proceedings of the Royal Society,* ser. A, v. 212, May 22, 1952, p. 439-520.

Includes introduction by F. P. Bowden, plus eight papers on friction of metals, four on friction of nonmetals, and five on boundary and e.p. lubrication, plus accompanying discussion. Selected papers are individually abstracted. (Q9)

572-Q. Influence of Oxide Films on Metallic Friction. R. Wilson. *Proceedings of the Royal Society,* ser. A, v. 212, May 22, 1952, p. 450-452; disc., p. 480-482.

Mechanism of metallic friction in air was investigated for loads ranging from 0.003 to 10,000 mg. The metals studied include Pt, Au, Ag, Cu, Sn, Pb, Zn, Cd, Mg, Al and Cr. Earlier work of Whitehead was extended and simultaneous measurements made of frictional force and the electrical resistance between the sliding surfaces. The results show that, with most metals, the natural oxide layer is sufficient to prevent metallic contact at very small loads. (Q9)

573-Q. Relation Between Friction and Hardness. A. J. W. Moore and W. J. McG. Tegart. *Proceedings of the Royal Society,* ser. A, v. 212, May 22, 1952, p. 452-458.

Experiments on a series of Cu-Be alloys show that friction decreases linearly with hardness. For a given load, amount of plastic deformation at points of intimate contact is greater for a soft metal. It is suggested that this deformation facilitates disruption of the oxide film so that, for softer metals, the proportion of oxide-free junctions is greater. The resulting frictional force is therefore higher. (Q9, Q29, Cu)

574-Q. Surface Changes Due to Sliding. G. I. Finch and R. T. Spurr. *Proceedings of the Royal Society,* ser. A, v. 212, May 22, 1952, p. 462-464; disc., p. 478.

Metallic bearing surfaces on sliding become coated with an amorphous Beilby layer formed by the smearing out of molten projections. The heating has been held to be due to friction between the metals themselves. However, there are many examples of formation of Beilby layers where there is no evidence of the occurrence of direct intermetallic contact and where the frictional forces must have been other than between metals. (Q9)

575-Q. Friction and Cohesion Between Single Crystals of Copper. A. T. Gwathmey, H. Leidheiser, Jr., and G. P. Smith. *Proceedings of the Royal Society,* ser. A, v. 212, May 22, 1952, p. 464-467.

Experiments were carried out between two large crystals of Cu of controlled orientation from the surface of which all oxide had been removed. One crystal was in the form of a sphere and the other a sphere with two flat surfaces parallel to particular planes. Coefficient of dry static friction between two (100) faces was greater than 100 and between (111) faces was approximately 25. The greater value for the (100) faces is attributed to greater digging-in and increased area of contact produced by slip as displacement occurs. (Q9, Cu)

576-Q. Wear Processes on Cemented Carbide Tools Used in Cutting Steel. E. M. Trent. *Proceedings of the Royal Society,* ser. A, v. 212, May 22, 1952, p. 467-470.

Examination of the worn top surface of tools of two types (tungsten carbide and cobalt, and tungsten carbide, titanium carbide and cobalt) showed that in cutting steel, an alloy is formed between the steel and the tungsten carbide at temperatures of about 1300° C., leading to very rapid wear. Consideration of phenomena of wear on such tools presents a picture of the type of temperature gradient in the tool near the friction surface. (Q9, C-n, ST)

577-Q. Metallic Wear. J. T. Burwell and C. D. Strang. *Proceedings of the Royal Society,* ser. A, v. 212, May 22, 1952, p. 470-477.

Experiments on wear between a cylindrical metal pin and a hardened steel disk. Under steady-state conditions at light loads, it was found that volume of material worn away is proportional to load, and to length of path traversed. Results are discussed in relation to the problem of running-in newly assembled machine parts. (Q9)

578-Q. Introduction to the Discussion: The Mechanism of Friction. F. P. Bowden. *Proceedings of the Royal Society,* ser. A, v. 212, May 22, 1952, p. 440-449; disc., p. 477-479.

The application of the electron microscope, and of metallurgical, interferometric and other physical methods, shows that even carefully polished or cleaved surfaces have irregularities on them which are large compared with molecular dimensions. Mechanism of the plastic-flow process was studied by optical and metallurgical methods and by use of artificially radioactive met-

als. Effects of oxide film strength and nature of adhesion between metals. (Q9)

579-Q. Notes on the Adhesion of Indium in Impact. A. W. Crook. *Proceedings of the Royal Society,* ser. A, v. 212, May 22, 1952, p. 482-483.

Investigation of adhesion of two surfaces of indium. Results are charted. (Q6, Q9, In)

580-Q. Comment on the Frictional Behaviour of Porous Metal Impregnated with P.T.F.E. P. P. Love. *Proceedings of the Royal Society,* ser. A, v. 212, May 22, 1952, p. 484.

"P.T.F.E." is polytetrafluoroethylene. Compares running tests on porous 89-11 Cu-Sn bearings impregnated with this compound and with oil. (Q9, Cu)

581-Q. Mechanism of Boundary Lubrication. D. Tabor. *Proceedings of the Royal Society,* ser. A, v. 212, May 22, 1952, p. 498-505; disc., p. 516.

How the theory of metallic friction is modified in the presence of boundary films. Minute metallic junctions contribute to the frictional resistance and play a major part in wear of lubricated surfaces. Effect of temperature shows that the most effective lubrication is provided by a solid boundary film which possesses a close-packed strongly oriented structure. A recent study of metal transference from one surface to the other as sliding takes place, using radioactive metals, shows that, at the melting-point of the lubricant film, a marked increase in pickup and friction occurs. At still higher temperatures, a second deterioration in lubricating properties occurs, corresponding to desorption of the lubricant film. (Q9)

582-Q. Effect of Surface Structure, Composition and Texture on Friction Under Boundary Conditions. F. T. Barwell. *Proceedings of the Royal Society,* ser. A, v. 212, May 22, 1952, p. 508-512.

Experiments wherein frictional behavior of surfaces of stainless steel specimens prepared in various ways was compared. Effect of different oxide films is best illustrated by reference to pure Al, the surface of which has been oxidized under different environmental conditions. (Q9)

583-Q. Mechanism of Action of Extreme Pressure Lubricants. C. G. Williams. *Proceedings of the Royal Society,* ser. A, v. 212, May 22, 1952, p. 512-515.

Variations among different metals, as well as among different e.p. lubricants. (Q9)

584-Q. Variation With Load of the Coefficient of Friction and Metallic Transfer Under Conditions of Boundary Lubrication. W. Hirst, M. Kerridge, and J. K. Lancaster. *Proceedings of the Royal Society,* ser. A, v. 212, May 22, 1952, p. 516-520.

Several papers published recently show for a number of metals that, under certain experimental conditions, several molecular layers of boundary lubricant are necessary to give effective lubrication. Recent experiments by the authors suggest that these results represent parts of a more general pattern. Graphs, macrographs, micrographs, and 82 ref. (Q9)

585-Q. Selecting Metals for Low Temperature Service. J. R. Watt. *Product Engineering,* v. 23, June 1952, p. 158-161.

Factors affecting impact strength at room temperature increase in importance at subzero temperatures. How grain size, carbon content, alloy content, heat treatment, and welding temperatures of steel affect transition temperature. Data for tin and solder, Zn-base alloys, wrought and ingot iron. (Q6, ST, Fe, Zn, Sn)

586-Q. Plating Effects Tested. *Steel,* v. 130, June 16, 1952, p. 104.

Brief report of effect of several Cr plating solutions on the fatigue strength of aircraft-quality SAE 4130 steel. Table. (Q7, L17, AY, Cr)

587-Q. What Can Be Learned From the Hardness Test? Part I. Howard E. Boyer. *Steel Processing,* v. 38, May 1952, p. 223-227.

Background information and principles primarily intended for operators of hardness testing equipment and for inspection supervisors. Part I: History and conventional methods. Photographs and diagrams. (To be continued.) (Q29)

588-Q. (Book) **Engineering Materials; Their Mechanical Properties and Applications.** Joseph Marin. 491 pages. 1952. Prentice-Hall, Inc., 70 Fifth Ave., New York 11, N. Y.

Part I: Mechanical properties of materials, their definition, determination, and utilization. Static, fatigue, impact, and high and low-temperature loading conditions such as tension, compression, bending, and torsion. Utilization of mechanical properties in simple machine and structural design problems. Part Two: Brief treatment of a number of important engineering materials. Emphasis is placed on mechanical properties and factors influencing them. Part Three: The more important testing machines and strain gages

used for determination of mechanical properties. Problems and references. (Q general)

589-Q. (Book) **Mechanics. Part I. Statics.** J. L. Meriam. 340 pages. 1952. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y.

The first of two volumes covering basic engineering mechanics integrates the usual pre-engineering back-ground of physics, mathematics, and graphics. Progresses in easy stages from fundamentals to advanced theory; importance of principles and problems which apply them. 672 practical problems. Answers are given for more than half of these problems, and all are profusely illustrated. (Q general)

590-Q. (Book) **Strength of Metal Aircraft Elements.** Rev. Ed. 125 pages. June 1951. Subcommittee on Air Force-Navy-Civil Aircraft Design Criteria, Aircraft Committee, U. S. Munitions Board, Washington. (For sale by U. S. Govt. Printing Office, Washington, D. C.) 55c.

Chapter 1: Standard structural symbols, basic principles and definitions, types of failures, etc. The other four chapters cover general properties, columns, beams, torsion, combined loadings, joints, parts. and fittings of steel, Al alloys, Mg alloys, and miscellaneous metals. (Q23)

591-Q. Pre-Tensioning for Preventing Fatigue Failure in Bolts. Simple Theory and an Account of Experiments Carried Out at the R. A. E. W. A. P. Fisher, R. H. Cross, and G. M. Norris. *Aircraft Engineering,* v. 24, June 1952, p. 160-163.

A simple elastic theory of reduction of bolt-load fluctuation obtained by deliberate pre-tensioning, and some fatigue tests which establish the principle. The form of joint considered is that for which tensile load is transmitted from one member to another through an axially loaded bolt. Experimental results are given for ¾-in. steel bolts tested in steel and in Al alloy fittings. Tables, graphs, and photographs. (Q7, K13, ST)

592-Q. Report of Joint Committee on Effect of Temperature on the Properties of Metals. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 216-235.

Report on publications and technical papers, research projects, etc., plus two project reports. "Study of Effects of Variables on the Creep Resistance of Steels", H. C. Cross and J. A. VanEcho: Test program intended to determine whether a relationship between Si and Al additions might be used to control the creep resistance of fine-grained carbon steels. Higher than normal Si contents did not produce good creep properties in AISI 1015 Al-treated steels. "Stability of Steels as Affected by Temperature", J. J. Kantner and E. A. Sticha: Graphitization test data on 40 different heats of several low-alloy steels. (Q3, N8, CN, AY)

593-Q. Report of Committee E-9 on Fatigue. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 488-489.

Organizational changes; list of papers screened and accepted; activities of subcommittees. (Q7)

594-Q. The Influence of Surface Roughness on the Fatigue Life and Scatter of Test Results of Two Steels. P. G. Fluck. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 584-591; disc., p. 591-592.

Previously abstracted from Preprint 20. See item 332-Q, 1951. (Q7, CN, AY)

595-Q. Effect of Residual Stress on the Fatigue Strength of Notched Specimens. D. Rosenthal and G. Sines. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 593-608; disc., p. 608-610.

Previously abstracted from Preprint 17. See item 366-Q, 1951. (Q7)

596-Q. Damping, Fatigue, and Dynamic Stress-Strain Properties of Mild Steel. B. J. Lazan and T. Wu. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 649-678; disc., p. 678-681.

Previously abstracted from Preprint 22. See item 467-Q, 1951. (Q7, Q8, CN)

597-Q. Fatigue Strength of Ball Bearing Races and Heat-Treated 52100 Steel Specimens. Haakon Styri. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 682-697; disc., p. 697-700, 719-720.

Previously abstracted from Preprint 23. See item 367-Q, 1951. (Q7, AY)

598-Q. Laboratory Evaluation of Materials for Marine Propulsion Gears. M. R. Gross. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 701-716; disc., p. 716-720.

Previously abstracted from Preprint 38. See item 370-Q, 1951. (Q7, T7)

599-Q. The Fatigue Test as Applied to Lead Cable Sheath. G. R. Gohn and W. C. Ellis. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 721-740; disc., p. 741-744.

Previously abstracted from Pre-

print 24. See item 368-Q, 1951. (Q7, Pb)

600-Q. The Influence of Frequency on the Repeated Bending Life of Acid Lead. John F. Eckel. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 745-756; disc., p. 757-760.

Previously abstracted from Preprint 25. See item 334-Q, 1951. (Q5, Pb)

601-Q. Compression Tests on Lead Alloys at Extrusion Temperatures. G. M. Bouton and G. S. Phipps. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 761-770; disc., p. 770.

Previously abstracted from Preprint 26. See item 369-Q, 1951. (Q28, Pb)

602-Q. The Influence of Cold Work and Heat Treatment on the Engineering Properties of Beryllium Copper Wire. J. T. Richards, R. K. Levan, and E. M. Smith. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p.771-791.

Electrical conductivity and tension tests were performed on Be-Cu wire to determine influence of cold work, solution treating, and precipitation hardening. Grain size, preferred orientation, straightening, overstraining in tension, and stress-relieving were found to have a marked effect upon tensile strength, proportional limit, ductility, and tension modulus. Method of plotting stress-strain data. (Q27, P15, Cu)

603-Q. Fatigue Tests in Axial Compression. N. M. Newmark, R. J. Mosborg, W. H. Munse, and R. E. Elling. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 792-803; disc., p. 804-810.

Preliminary results of an investigation of the behavior of materials subjected to repeated compressive loads. Exploratory studies were conducted on gray cast iron, 24S-T Al alloy, and steel. In general, compressive failures occurred only under high stresses. Results, under nearly uniformly distributed axial compressive loads, are in distinct contradiction to those obtained with notched specimens or with repeated bending tests. (Q7, CI, Al, ST)

604-Q Prediction of Relaxation of Metals From Creep Data. Irving Roberts. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 811-825; disc., p. 826-831.

Previously abstracted from Preprint 37. See item 338-Q, 1951. (Q3)

605-Q. Mechanical Properties in Torsion and Poisson s Ratio for Certain Stainless Steel Alloys. C. W. Muhlenbruch, V. N. Krivobok, and C. R. Mayne. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 832-852; disc., p. 853-856.

Modulus of elasticity in shear, shearing yield strength, and Poisson's ratio were studied for a number of AISI 300 stainless steels. Values for secant shearing modulus of elasticity and yield strength at a limiting amount of torsional strain are given. Reasons for behavior are based on analysis of stress-strain relationships, susceptibility to work hardening, and state of stress in the material when subjected to axial loading. A theoretical relationship between Poisson's ratio and secant moduli in tension and shear. (Q21, Q1, SS)

606-Q. Creep-Rupture of Several Sheet Steels. G. V. Smith, E. J. Dulis, and E. G. Houston. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 857-868; disc., p. 868.

Grips for testing sheet or strip in creep-rupture. Experimental results reported for annealed 18 Cr, 8 Ni (Mo) at 1100, 1300, and 1500° F.; annealed and half-hard 17 Cr, 7 Ni at 600 and 1100° F.; and cold-rolled 4608 (Ni, Mo) at 600° F. (Q4, SS, AY)

607-Q. Notch Toughness of Four Alloy Steels at Low Temperatures. W. B. Seens, W. L. Jensen, and O. O. Miller. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 918-928; disc., p. 929-930.

Steels containing nominally 2.5% Ni, 3.5% Ni, 3.5% Ni and 0.25% Mo and 9% Ni were investigated. Charpy impact specimens with keyhole notch were taken from ½-in. plates and from 2-in. plates of all four steels and from 0.24-in. or 0.30-in. tubing of 2317 and 2810 steels. (Q23, AY)

608-Q. Notch-Toughness of Fully Hardened and Tempered Low-Alloy Steels. R. L. Rickett and J. M. Hodge. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 931-944.

Previously abstracted from Preprint 31. See item 335-Q, 1951. (Q6, AY)

609-Q. Creep Properties of Two Tempers of 63S Extruded Aluminum Alloy. O. D. Sherby and J. E. Dorn. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 945-953; disc., p. 977-980.

Previously abstracted from Preprint 34. See item 337-Q, 1951. (Q3, Al)

610-Q. Effect of Annealing on the Creep Properties of 2S-O Aluminum

Alloy. O. D. Sherby and J. E. Dorn. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 954-963; disc., p. 977-980.

Effect of stabilizing anneals at 650, 950, and 1150° F. were investigated. Large grains were produced by the 1150° F. treatment, but the other two annealing temperatures produced no grain growth and were essentially recovery treatments. Creep rate decreased with increasing temperatures of anneal, irrespective of grain size, within the ranges of stress and temperature investigated. (Q3, J23, Al)

611-Q. The Creep Properties of Some Forged and Cast Aluminum Alloys. O. D. Sherby, T. E. Tietz, and J. E. Dorn. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 964-976; disc., p. 977-980.

Previously abstracted from Preprint 33. See item 336-Q, 1951. (Q3, Al)

612-Q. Creep Characteristics of Phosphorized Copper (0.019 Per Cent) at 300, 400, and 500 F. A. I. Blank and H. L. Burghoff. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 981-993; disc., p. 993-995.

Previously abstracted from Preprint 35. See item 468-Q, 1951. (Q3, Cu)

613-Q. Mechanical Properties of Copper at Various Temperatures. W. H. Munse and N. A. Weil. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 996-1019; disc., p. 1019-1022.

Results at temperatures from −321 to 400° F. Values of yield strength, ultimate strength, reduction of area, elongation, and modulus of elasticity. Three types of base material were studied: electrolytic tough-pitch Cu, deoxidized high-phosphorus Cu, and oxygen-free high-conductivity Cu. A supplementary series of tests was conducted on cold rolled, deoxidized, high-phosphorus Cu between −321 and 1200° F. Results are correlated with those reported in the literature for the same and similar materials. (Q general, Cu)

614-Q. Rheotropic Brittleness: General Behaviors. E. J. Ripling and W. M. Baldwin, Jr. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 1023-1030; disc. p. 1031-1037.

Previously abstracted from Preprint 39. See item 371-Q, 1951. (Q23, Zn)

615-Q. An Arbitration Bar Izod Impact Test for Cast Iron. J. T. Eash and A. P. Gagnebin. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 1061-1068; disc., p. 1068-1071.

Previously abstracted from Preprint 15. See item 364-Q, 1951. (Q6, CI)

616-Q. The Constancy of Calibration of Elastic Calibration Devices. W. C. Aber and F. M. Howell. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 1072-1084; disc., p. 1084-1086.

Devices used for calibrating testing machines throughout the Aluminum Co. of America, and their calibrations by the National Bureau of Standards. Importance of using dial indicators that will repeat readings within narrow limits. (Q general)

617-Q. Effect of Speed of Testing on the Tensile Properties of Copper and Copper-Base Alloys. N. H. Murdza. *American Society for Testing Materials,* Preprint 11a, 1952, 16 pages.

Results of a series of tests made by various government (both U. S. and Canadian) and industrial testing laboratories to show effect of speed on yield strength, tensile strength, and elongation of Cu and free-cutting brass rod. (Q27, Cu)

618-Q. Load-Deflection Relationships in Slow-Bend Tests of Charpy V-Notch Specimens. R. Raring. *American Society for Testing Materials,* Preprint 65, 1952, 16 pages.

Load-deflection diagrams of slow-bend tests, at temperatures through the transition range of Charpy V-notch specimens of quenched and tempered and of pearlitic steels containing 0.01-0.63% and having tensile strengths of 48,000-152,000 psi. Characteristics of the diagrams and of development of the crack. Results are compared, on the basis of energy absorbed and of transition temperature, with those of impact tests of the same steels. Some correlation between slow notch-bend tests and tension tests is shown. (Q5, CN)

619-Q. An Inquiry Into the Reproducibility of Impact Test Results. H. L. Fry. *American Society for Testing Materials,* Preprint 67, 1952, 4 pages.

Study consisted mainly of performing a large number of comparative tests on C-1020 and 4340 steels on five impact machines, with all variables controlled as closely as possible. Most of the work was done on keyhole-notch Charpy specimens, but Izod and V-notch Charpy specimens also studied. Tables and graphs. (Q6, CN, AY)

620-Q. Rheotropic Embrittlement. E. J. Ripling. *American Society for*

Testing Materials, Preprint 73, 1952, 6 pages.

The ductility deficiency exhibited by metals not crystallizing in the face-centered cubic system, when these metals are strained at low temperatures, high strain rates, or in the presence of hydrostatic tension, has recently been shown to be partially strain curable. The portion of this embrittlement which can be overcome by prestrain under some ductile conditions has been labeled "rheotropic embrittlement." Reviews recent literature on influence of variables which affect rheotropic behavior. Graphs. (Q23)

621-Q. Report on ASTM Task Group for Determination of Elastic Constants. Walter Ramberg. *American Society for Testing Materials,* Preprint 158, 1952, 7 pages.

Task Group mission was "to survey the work done in determining the elastic constants of materials and to recommend suitable methods for determination of elastic moduli". Results of questionnaire are charted, tabulated, and show the need for better methods of determining elastic constants of metals at elevated temperatures and of nonmetals at all temperatures below the softening temperature. (Q21)

622-Q. The Influence of Temperature on the Elastic Constants of Some Commercial Steels. F. Garofalo, P. R. Malenock, and G. V. Smith. *American Society for Testing Materials,* Preprint 159, 1952, 18 pages.

Elastic moduli in tension and in shear were determined at various temperatures between 75 and 1500° F. for 21 commercial steels, both carbon and alloyed. Very good agreement was found between the data obtained and results, determined both statically and dynamically, reported by other investigators. 20 ref. (Q21, ST)

623-Q. Influence of the Volume Fractions of the Phases on the Deformation of ($\alpha + \beta$) Brass. L. M. Clarebrough and G. R. Porger. *Australian Journal of Scientific Research,* ser. A, v. 5, Mar. 1952, p. 114-118.

Relative deformations of the phases were studied, after 20, 40, 60, and 80% reductions in area by wire-drawing in duplex brasses of various compositions, using as a measure of degree of deformation the temperature at which recrystallization began. Mode of recrystallization of the phases varied with the degree of deformation and volume proportion of the phases. (Q24, N5, Cu)

624-Q. Castings to Resist Abrasive Wear. E. J. Brown. *Foundry Trade Journal,* v. 92, June 5, 1952, p. 587-595.

Contains a general discussion of wear. Shows how Mn steel as well as Ni-Cr alloy cast irons and other alloy steels have been developed to meet a number of service conditions. Manufacturing methods and applications for these materials. Flame hardening, nitriding, surface deposits of abrasion resisting material, heat treatment of Mn steel and alloy cast iron, and work hardening of steel. Photomicrographs, graphs, diagrams, and photographs. (Q9, J general, CI, AY, ST, SG-m)

625-Q. Nucleation and Growth of Flow and Fracture Markings. Waller George. *Industrial and Engineering Chemistry,* v. 44, June 1952, p. 1328-1331.

Macroscopic observations of the temporal and spatial development of localized plastic flowing and fracturing in polymeric solids (and metals) are used to suggest "models" of the physical character of the microscopic processes of plastic flow. Nature of delayed yielding in metals and polyamides. Advance nucleation of macroscopic flow and fracture elements in the region of stress concentration in advance of the primary flow or fracture event. This effect is illustrated in the growth of fatigue fractures, creep fracture, horizontal flow markings, or craze cracks. Fracture pairs and showers are illustrated. 33 ref. (Q24, N2)

626-Q. Wear of Fuel Injection Equipment and Filtration of Fuel for Compression-Ignition Engines. A. E. W. Austen and B. E. Goodridge. *Institution of Mechanical Engineers, Proceedings,* (Automobile Div.), pt. 3, 1950-1951, p. 85-95; disc., p. 95-104.

Dependence of wear of fuel-injection equipment on abrasive-particle size. Mechanism of wear; properties of filters; nature and particle sizes of solids in fuels; effect of filters in reducing abrasive wear; review of service experience with current filters; choking properties of filter materials; and a hypothesis of the choking mechanism. Graphs, diagrams, tables, interference and other photomicrographs. (Q9)

627-Q. Cutting Tools: Microhardness Testing May Show Road to Better Tool Results. *Iron Age,* v. 169, June 19, 1952, p. 184-185.

The method and two applications: on high speed steel, and for carbides in high speed steel. (Q29, TS, C-n)

628-Q. On the Direction of Fatigue Cracks in Polycrystalline Ingot Iron. F. A. McClintock. *Journal of Applied Mechanics,* v. 19, *(Transactions of the American Society of Mechanical Engineers,* v. 74), Mar. 1952, p. 54-56.

A statistical analysis is developed to show how a microscopic shear failure can result in the apparent tensile failure of polycrystalline iron in rotary bending fatigue tests. For comparison with theory, 12 Moore-type specimens of ingot iron were run at 27,000 psi and examined. 10 ref. (Q7, Fe)

629-Q. The Theoretical Analysis of Metal-Forming Problems in Plane Strain. E. H. Lee. *Journal of Applied Mechanics,* v. 19, (*Transactions of the American Society of Mechanical Engineers,* v. 74), Mar. 1952, p. 97-103.

Plastic flow in plane strain of an ideally plastic material subjected to large strains. Elastic strains are negligible and a rigid-plastic type of analysis is adopted. Indicates errors in solutions in the literature based on stress equations only. Includes appendix on determination of plastic-rigid boundary. 26 ref. (Q24)

630-Q. Statistical Design of Fatigue Experiments. Waloddi Weibull. *Journal of Applied Mechanics,* v. 19, (*Transactions of the American Society of Mechanical Engineers,* v. 74), Mar. 1952, p. 109-113.

An analytical expression connecting fatigue lives with applied stresses, and methods for computing the values of its parameters from experimental data. Formulas for estimating the uncertainty of computed parameter values are deduced. Testing time and costs may be reduced by more than 40% using the formulas. Example for pulsating tensile fatigue tests on Al alloy 75S. Graphs and tables. (Q7, Al)

631-Q. Effect of Temperature on the Tensile Properties of High-Purity Nickel. William D. Jenkins and Thomas G. Digges. *Journal of Research of the National Bureau of Standards,* v. 48, Apr. 1952, p. 313-324.

Tension tests were made at temperatures from −320 to 1500° F. on annealed high-purity Ni. Exceptions to the usual trend of decreasing strength and increasing ductility with increasing test temperatures were observed. (Q27, Ni)

632-Q. Fatigue of Aircraft Materials With Special Reference to Micro-Structure. P. L. Teed. *Journal of the Royal Aeronautical Society,* v. 56, June 1952, p. 427-437.

A general discussion of microstructure illustrated by photomicrographs, followed by a consideration of effect of microstructure on fatigue. A variety of metals and alloys are mentioned. Graphs and tables. (Q7, M27)

633-Q. Magnesium-Rare Earth Alloys. J. C. McDonald. *Machine Design,* v. 24, June 1952, p. 260, 262, 264.

See abstract of "Use of Rare Earth Metals in Magnesium Casting Alloys," *Light Metal Age;* item 109-Q, 1952. (Q general, E25, Mg, SG-h)

634-Q. European Research on the Behavior of Metals Yields Promising Results. Thomas J. Dolan. *Materials & Methods,* v. 35, June 1952, p. 93-96.

Unusual testing methods used to determine design criteria and especially to study the nature of fatigue and creep. Work on experimental stress analysis is included. Observations were made in England, Scotland, Switzerland, and Sweden. (Q7, Q3)

635-Q. Softening Induced by Cold Working. *Metal Progress,* v. 67, June 1952, p. 122, 124, 126-128, 140. (Condensed from "Softening of Metals During Cold Working", N. H. Polakowski.)

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 154-Q, 1952. (Q24, N5, Cu, Ni, Al, ST)

636-Q. Redefinition of "Strength of Materials". *Metal Progress,* v. 67, June 1952, p. 140, 142, 144. (Condensed from "A New Version of 'Strength of Materials' ", A. C. Vivian.)

Previously abstracted from *Metallurgia.* See item 238-Q, 1952. (Q23, M25, M26)

637-Q. Creep Properties of Solution Treated N-155. *Metal Progress,* v. 67, June 1952, p. 148, 150, 152, 154. (Condensed from "Fundamental Effects of Aging on Creep Properties of Solution Treated Low-Carbon N-155 Alloy", D. N. Frey, J. W. Freeman, and A. E. White.)

Previously abstracted from *National Advisory Committee for Aeronautics,* Technical Report 1001, 1950. See item 743-Q, 1951. (Q3, SS)

638-Q. High-Temperature Aluminum Alloy. *Metal Progress,* v. 67, June 1952, p. 162, 164, 166. (Condensed from "A Mischmetal Aluminum Alloy for Elevated Temperature Service", B. M. Loring, W. H. Baer, and C. G. Akerlind, *Naval Research Laboratory,* Report 3871, Nov. 1, 1951.)

An alloy of Al and mischmetal (50% Ce and the rest the other rare earths, including La) was found to have considerable promise as a high-temperature alloy in comparison with conventional age harden-

ing Al alloys. Mechanical-test data are tabulated and charted. Melting procedure to avoid segregation. (Q general, E25, Al, EG-g)

639-Q. Friction and Surface Damage of Several Corrosion-Resistant Materials. Marshall B. Peterson and Robert L. Johnson. *National Advisory Committee for Aeronautics,* Research Memorandum E51L20, Feb. 20, 1952. 20 pages.

An investigation was made in air, of friction and surface damage of several materials resistant to corrosion by liquid metals. Values of kinetic friction coefficient at low sliding velocities and photomicrographs of surface damage were obtained. Appreciable surface damage was evident for all materials tested except tungsten carbide. (Q9, ST, SS, Ni, W, C-n)

640-Q. Effect of Open Circular Holes on Tensile Strength and Elongation of Sheet Specimens of a Magnesium Alloy. R. S. Barker. *National Advisory Committee for Aeronautics,* Technical Note 2716, June 1952, 24 pages.

Data tabulated, charted, and discussed. 10 ref. (Q27, Mg)

641-Q. Fatigue and Static Tests of Flush-Riveted Joints. Darnley M. Howard and Frank C. Smith. *National Advisory Committee for Aeronautics,* Technical Note 2709, June 1952, 38 pages.

Fatigue tests at zero mean load were made on 190 multiple-rivet joints having ⅛-in. diameter A17S-T3 100° countersunk-head rivets. Both butt and lap joints were tested. Static tests were made on 34 typical joints. The sheet materials used were 0.032-in. bare and Alclad 75S-T6, 0.032-in. bare and Alclad 24S-T3, and 0.064-in. Alclad 75S-T6. Apparatus and results. (Q7, K13, Al)

642-Q. "Elastic" and "Plastic" Hardness of Hard Materials. P. Grodzinski. *Nature,* v. 169, May 31, 1952, p. 925-926.

Method for measuring hardness based on application of a thin evaporated Ag layer to the matrix surface. Materials tested include boron and silicon carbide, synthetic corundum, and diamond. Graph and table. (Q29, C-n)

643-Q. Influence of Structure on the Plastic Flow of Steel Above the A_3 Point. P. Feltham. *Nature,* v. 169, June 7, 1952, p. 976.

Study of the relationship between temperature and flow-rate of steel at a given stress. Results of experiment shown graphically. (Q24, ST)

644-Q. Remotely-Operated Impact Tester. W. Pate, E. Hutto, and E. Marguerat. *Nucleonics,* v. 10, June 1952, p. 60.

Remote operation of an impact tester, handling radio-active test specimens through a 3-ft. wall. (Q6)

645-Q. Critical Shear Stresses in Body-Centered Cubic Lattices. R. Smoluchowski. *Physical Review,* ser. 2, v. 86, June 1, 1952, p. 787-789.

Shows how a consideration of shape and atomic configuration of dislocations in a body-centered cubic lattice allows an estimate of the ratio of critical shear stresses on various slip planes as a function of temperature. Table showing relative values of critical shear stresses of Cu, Zn and Fe. (Q2, Cu, Zn, Fe)

646-Q. The Influence of Electrolytes on the Mechanical Properties of Certain Metal Single Crystals. E. N. da C. Andrade and R. F. Y. Randall. *Proceedings of the Physical Society,* v. 65, sec. B, June 1, 1952, p. 445-454.

Shows that the contact of electrolytes has a marked effect on the mechanical behavior of single crystals of Cd and Zn which have been exposed to the air. 10 ref. (Q general, Cd, Zn)

647-Q. Smooth Surfaces Don't Always Give Least Wear. *SAE Journal,* v. 60, June 1952, p. 57-60; disc., p. 60. (Excerpts from "Surface Finish—Its Effect on Wear", by C. R. Lewis.)

Research studies show that smooth surfaces wear more slowly than rough ones under ideal laboratory conditions. However, in applying the results to production machinery, it is necessary to exercise considerable caution. In many cases, fits of wearing surfaces are seldom those envisaged by designers, and best results are obtained by allowing some initial roughness. Effects of secondary influences. Graphs. (Q9)

648-Q. What Can Be Learned From the Hardness Test. Part II. Howard E. Boyer. *Steel Processing,* v. 38, June 1952, p. 280-285, 298-299.

Common errors in hardness testing operations: design of suitable supporting structures; use of different indenters; brands of hardness testers; and microhardness testing. Diagrams, photographs; and photomicrographs. (Q29, TS, Al)

649-Q. A New High-Yield-Strength Alloy Steel for Welded Structures. L. C. Bibber, J. M. Hodge, R. C. Altman, and W. D. Doty. *Transactions of the American Society of Mechanical Engineers,* v. 74, Apr. 1952, p. 269-284; disc., p. 284-285.

Development, metallurgical characteristics, welding and gas-cutting

characteristics, low - temperature toughness, applications, and engineering potentialities of USS "Carilloy" steel designated "T-1" is characterized by yield strength levels of 100,000 psi. and above. At these high strengths, it retains its toughness to much lower temperatures than ordinary structural steels. In addition, welds which develop the full strength of the base metal can be made without preheating or postheating. (Q23, K general, AY)

650-Q. Fatigue Tests of Piping Components. A. R. C. Markl. *Transactions of the American Society of Mechanical Engineers,* v. 74, Apr. 1952, p. 287-299; disc., p. 299-303.

Compilation of available fatigue-test data on steel piping components. Stress-intensification factors relative to straight pipe are derived. Suggests empirical correlations by which application of the available data can be expanded to a wider range of sizes and conditions. 14 ref. (Q7, ST)

651-Q. Peculiar Behavior of Steel Beams Under Dead Loads That Produce Inelastic Strains. H. T. Corten, M. E. Clark, and O. M. Sidebottom. *Transactions of the American Society of Mechanical Engineers,* v. 74, Apr. 1952, p. 349-354.

Investigation was undertaken to determine effect of testing members under dead load where each increment of load could be maintained on the member a sufficient length of time until equilibrium was attained. Five statically determinate beams, four mild-steel beams of various cross sections, and one rail-steel rectangular beam were tested in a dead-load testing machine. Load-deformation diagrams were found to have a stairstep appearance, unlike the smooth continuous curves usually reported. Ultimate load-carrying capacity of the mild-steel beams was found to be considerably below that predicted by theory. (Q23, CN)

652-Q. An Experimental Investigation of Over-Straining in Mild-Steel Thick-Walled Cylinders by Internal Fluid Pressure. M. C. Steele and John Young. *Transactions of the American Society of Mechanical Engineers,* v. 74, Apr. 1952, p. 355-361; disc., p. 361-363.

Mechanism of yielding was studied and strains observed at the bore and outside surfaces of mild steel cylinders of 2:1 diameter ratio under internal fluid pressure were compared with plastic theories. Observations disagree with theoretical assumptions concerning the progression of yielding. (Q23, CN)

653-Q. Dynamic Properties of Nodular Cast Iron. Part I. Harry Majors, Jr. *Transactions of the American Society of Mechanical Engineers,* v. 74, Apr. 1952, p. 365-375; disc., p. 376-380.

Results of investigation on mechanical properties of Mg-treated nodular cast iron in the annealed and as-cast condition. Dynamic stress-concentration factors are compared with Neuber's theoretical factors for hyperbolic notches, with Peterson's results on steel, with Frocht's photo-elastic results, and with Grant's data on flake cast iron and Ce-treated nodular iron. Fatigue results are shown for square and 45° V notches at 200 and 6000 r.p.m., as well as for various notch depths. Static damping capacities are compared with torsional damping capacities. 30 ref. (Q general, CI)

654-Q. Relaxation of Stress in a Heat-Exchanger Tube of Ideal Material. E. A. Davis. *Transactions of the American Society of Mechanical Engineers,* v. 74, Apr. 1952, p. 381-385.

Analytical solutions of the relaxation of an elasticoviscous tube in a rigid tube sheet in both plane stress and modified plane strain are worked out. Effect of reloading tensile specimens in relaxation; results of tests on an Al alloy illustrate these effects. (Q3, Al)

655-Q. Strain-Hardening and Softening With Time in Reference to Creep and Relaxation in Metals. A. Nadai. *Transactions of the American Society of Mechanical Engineers,* v. 74, Apr. 1952, p. 403-413.

Analytical expressions are formulated for describing influence of strain hardening, of time rate of change of flow resistance, and of recovery strains on creep and relaxation of metals under uniaxial stress. (Q3)

656-Q. A Critical Review of the Criteria for Notch-Sensitivity in Fatigue of Metals. C. S. Yen and T. J. Dolan. Engineering Experiment Station, University of Illinois, Bulletin Series 398, Mar. 1952, 55 pages. (*University of Illinois Bulletin,* v. 49, No. 53.)

Includes graphs. 54 ref. (Q7)

657-Q. Nitrogen Content and Low-Temperature Brittleness of Steel. *Welding Journal,* v. 31, June 1952, p. 474-475. (Condensed from "Influence of Nitrogen on the Notch Toughness at Low Temperatures of Heat-Treated 0.3 Percent Carbon Steel," G. W. Geil, N. L. Carwile, and T. G. Digges.)

Previously abstracted from *Journal of Research of the National Bureau of Standards.* See item 538-Q, 1952. (Q23, CN)

658-Q. Stress Concentrations in Steel Under Cyclic Load. E. Orowan. *Welding Journal,* v. 31, June 1952, p. 273s-282s.

Behavior of stress concentrations in ductile bodies under cyclic load with particular reference to steel pressure vessels. Influence of local plastic yielding on final stress range at a stress peak; progressive change of stress and strain cycles in the plastic surface layers of a rod in alternating bending; progressive change of local stress and strain amplitudes in general cyclic bending, and in repeated bending; the Bauschinger effect; other cases of stress inhomogeneity; connection with the physical theory of fatigue; observed fatigue behavior of bent and notched specimens; fatigue at high stress amplitudes; local strain hardening during the pressure test; and effect of strain aging. Schematic diagrams. (Q24, Q5, Q7, ST)

659-Q. (Dutch.) **Fatigue Testing at the T. N. O. Metals Institute.** F. H. Toneman. *TNO Nieuws,* v. 7, May 1952, p. 142-146.

Types of fatigue testing and operation of the 100-ton apparatus. Photographs and a chart. (Q7)

660-Q. (French.) **Relationship Between Tensile and Creep Strains and Recrystallization.** B. Jaoul and C. Crussard. *Metallurgia Italiana,* v. 44, May 1952, p. 175-179.

During a study of the shape of tensile strength curves of several Al alloys, a snarp break in the plastic deformation curves was found to exist. Formulas represent the two portions of the curve. The transition point between the two types of deformation corresponds to the beginning of fracture of the grains. Creep tests on the same alloys show that stress corresponding to the beginning of fracture has approximately the same value as creep limit. Concludes that creep cannot occur until grain fracture begins. From exact analysis of the stress curves, approximate values of creep limit and critical recrystallization point may be determined. Graphs. 13 ref. (Q23, Q3, Al)

661-Q. (French.) **Influence of Thermal Treatment on Tensile-Stress Curves of Mild Steel.** P. Bastien and C. Winter. *Revue de Métallurgie,* v. 49, May 1952, p. 328-337; disc., p. 338.

Mild steels of various composition were studied. Influence of thermal treatment on plasticity moduli, and the experimental set-up. Data are tabulated and charted. Test specimens are illustrated. (Q27, CN)

662-Q. (German.) **Research on Cast Aluminum Alloys for Cylinder Heads.** H. Vosskühler. *Aluminium,* v. 28, Apr. 1952, p. 99-106.

High-temperature tensile and creep tests on a series of 18 Al alloys, compositions of which are tabulated. The one found to be best is called "Hy-511". It contains 5% Mg, 1% Si, and small amounts of Mn, Fe, and Ti. Its thermal conductivity increases more rapidly with temperature than that of other alloys, which is desirable for cylinder heads. Tables and graphs. 16 ref. (Q27, Q3, P11, Al)

663-Q. (German.) **The New Light-Metal Bearing Alloy, K-4.** A. Rühenbeck. *Metall,* v. 6, June 1952, p. 291-298.

Fundamentals of the metallurgy of bearing metals; properties of the "K-4" Al-Zn-Mg bearing alloy, its testing, further developments, and economic considerations. Micrographs and macrographs illustrate structures of different bearing alloys. Comparative properties are tabulated and charted. (Q general, M27, Al, SG-c)

664-Q. (German.) **Metals and Insulating Materials—a Comparison.** W. Späth. *Metall,* v. 6, June 1952, p. 305-307.

Compares some mechanical and physical test results for rubbers and plastics with corresponding data for metals. Similarities and differences. (Q general, P general)

665-Q. (German.) **Mechanics of Materials.** E. Siebel. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, June 1, 1952, p. 465-471.

The mechanical behavior of crystalline materials under tensile stress can be ascribed to the interaction between shear strength and slip, flow, and fracture resistances. Thermal motion of the atoms reduces slip resistance and coherence of the material. Differences of effects of tension and compression under alternating stress. Photographs, diagrams, and graphs. 13 ref. (Q24)

666-Q. Strain Ageing: A Survey of the Literature. F. G. Lewis. *Aeronautical Research Laboratories, Dept. of Supply, Commonwealth of Australia,* Report SM-187, Jan. 1952, 56 pages.

Critical review of all aspects of the strain aging of steel including effect on mechanical and physical properties; influence of composition; relationship between strain aging and quench aging; yield point and blue brittleness, and current theories. Graphs and photomicrographs. 72 ref. (Q general, P general, N7, ST)

667-Q. Report of Committee E-1 on Methods of Testing. *American Society for Testing Materials,* Preprint 50, 1952, 21 pages.

Recommended revisions. Includes standard hardness conversion table for nickel and high-nickel alloys; relationship between diamond-pyramid hardness, Brinell hardness, and Rockwell hardness; and proposed method for diamond-pyramid hardness of metallic materials. (Q29, Ni)

668-Q. Effects of Machining Specimens on the Results of Tension Tests of Annealed Aluminum Alloys. G. W. Stickley and K. O. Bogardus. *American Society for Testing Materials,* Preprint 66, 1952, 6 pages.

Tension tests of the annealed temper of 15 compositions of Al alloys show that yield strength of high-purity Al may be doubled merely by machining the test specimen and that some alloys having higher yield strengths are affected similarly but to a lesser extent. There is also some effect on elongation. No effect on tensile strength was found. (Q27, Al)

669-Q. Creep-Tension Relations at Low Temperatures of Metals. J. D. Lubahn. *American Society for Testing Materials,* Preprint 71, 1952, 28 pages.

The best previous notion of how to determine creep behavior from the results of tension tests was to cross-plot tension curves determined at various constant rates. This procedure will not yield the creep curves for metals like Cu or 61S-T Al tested at room temperature because the stress-strain curves at different rates differ by less than the variations in deformation resistance among the specimens. A new procedure is suggested, based upon a logarithmic relationship resulting from the hypothesis that mechanical behavior is independent of past history. 25 ref. (Q3, Q27)

670-Q. The Influence of Periodic Overstressing on the Creep Properties of Several Heat Resistant Alloys. G. J. Guarnieri and L. A. Yerkovich. *American Society for Testing Materials,* Preprint 72, 1952, 13 pages.

Exploratory data for evaluating the significance of variables controlling the cyclic-load creep properties of heat resistant alloys. Test equipment and procedures were developed for conducting overload tests under conditions similar to those encountered in turbojet aircraft during maneuvering. Tests were conducted on Type 347 stainless steel at 1200 and 1500° F. for various normal stress levels. Similar tests were performed on N-155 alloy and H.S. 21 alloy. Results are correlated into design charts which relate stress, time, temperature, ratio of overstress to normal stress, and time percentage of overstress application. (Q3, SS, Co, SG-h)

671-Q. A Survey of Embrittlement and Notch Sensitivity of Heat Resisting Steels. George Sachs and W. F. Brown, Jr. *American Society for Testing Materials,* Preprint 74, 1952, 15 pages.

Results of each series of experiments are presented separately and an attempt is made to determine the general effects of the important variables, to show the relationship between the phenomena observed, and to suggest a mechanism for the embrittlement. (Q23, AY, SS, SG-h)

672-Q. Effect of a Notch and of Hardness on the Rupture Strength of "Discaloy". F. C. Hull, E. K. Hann, and H. Scott. *American Society for Testing Materials,* Preprint 75, 1952, 10 pages.

In an Fe-Ni-Cr-Mo-Ti austenitic alloy, effects of hardness as varied by the hardener, Ti, were related to the behavior of the material in the presence of a notch. Creep-rupture and notched-bar rupture tests were conducted at 1000 and 1200° F. Tables and graphs. (Q4, Fe, SG-h)

673-Q. Influence of Sharp Notches on the Stress-Rupture Characteristics of Several Heat-Resisting Alloys. W. F. Brown, Jr., M. H. Jones, and D. P. Newman. *American Society for Testing Materials,* Preprint 76, 1952, 21 pages.

Stress-rupture tests were carried out on a number of low-alloy steels, ferritic stainless steels, and austenitic alloys. Both unnotched and sharply notched bars were tested at various temperatures. Ductilities were determined for both unnotched and notched specimens. It was found that all alloys tested were subject to notch weakening. Tests at 900, 1000, 1100, and 1200° F. on a low-alloy Cr-Mo-V steel indicated the notch sensitivity to be time-temperature dependent. (Q4, AY, SS)

674-Q. Effect of Notch Geometry on Rupture Strength at Elevated Temperatures. E. A. Davis and M. J. Manjoine. *American Society for Testing Materials,* Preprint 78, 1952, 21 pages.

Three series of creep-rupture tests of notched bars with varying geometry of the notch were performed at elevated temperatures on several heat resistant alloys. Effect on

notch sensitivity on stress level, grain size, hardness, ductility, and heat treatment were also investigated. (Q4, SG-h)

675-Q. Theory of Time-Dependent Rupture and Interpretation of Some Stress-Rupture Data. D. N. Frey. *American Society for Testing Materials,* Preprint 80, 1952, 7 pages.

Proposes that the time-dependent rupture of a majority of steel and other austenitic alloys over the temperature range of interest in gas turbines (1000-1800° F.) be considered to have a mechanism involving both Griffith's and Zener's theories. Presents and interprets some data on effect of aging at 1400° F. prior to testing at 1200° F. on the strength of solution-treated 16-25-6 alloy. Effect of circumferential notches on elevated-temperature rupture strength. Graphs. 11 ref. (Q4, SS, SG-h)

676-Q. Effect of Sigma on Strength and Ductility of 25 Cr, 20 Ni Steel. G. V. Smith and E. J. Dulis. *American Society for Testing Materials,* Preprint 82, 1952, 11 pages.

Sigma phase in 25% Cr, 20% Ni austenitic stainless steel was found to cause moderate strengthening at room temperature, severe loss in toughness even at temperature as high as 500° F., and moderate loss of creep-rupture strength at 1300° F. (Q23, SS)

677-Q. Recovery and Creep in an Alloy Steel. H. A. Lequear and J. D. Lubahn. *American Society for Testing Materials,* Preprint 83, 1952, 17 pages.

By interrupting a creep test and observing that the creep rate is higher afterward than before by amounts increasing with duration of the interruption, it was possible to establish that recovery had occurred. Recovery occurs in quenched-and-tempered, low-alloy, Cr-Mo-V steel at 1000, but not at 800° F. (Q3, AY)

678-Q. Exploratory Investigation of High-Temperature Sheet Materials. D. Preston. *American Society for Testing Materials,* Preprint 85, 1952, 24 pages.

High-temperature mechanical properties of several materials commercially available in sheet form were determined. They included three Fe-base strain-hardening-type alloys, three Fe-base age-hardening-type alloys, and three Co-base alloys in the annealed condition. Microstructures. Creep, stress-rupture, and short-time tension and yield data for these alloys from room temperature to 1800° F. (Q general, M27, SS, Co, SG-h)

679-Q. The Statistical Nature of the Fatigue Properties of SAE 4340 Steel Forgings. J. T. Ransom and R. F. Mehl. *American Society for Testing Materials,* Preprint 87, 1952, 19 pages.

Investigated as a part of a systematic study of the mechanical properties of forging steels. Both high and low-quality forgings of the same tensile-strength level were studied. Specimens were taken in the longitudinal and transverse directions. Procedures were used to permit statistical analysis of variability of endurance limit and life to failure. Variability was found to be greater than generally estimated from results of conventional non-statistical testing programs. (Q7, AY)

680-Q. A Statistical Interpretation of the Effect of Understressing on Fatigue Strength. E. Epremian and R. F. Mehl. *American Society for Testing Materials,* Preprint 90, 1952, 7 pages.

Purpose of the investigation was to study the understressing effect from a statistical viewpoint. The experimental work was an extension of the research reported in a companion paper. The materials studied were annealed Armco iron, and SAE 4340 in two heat treatments: quenched and tempered, and quenched and spheroidized. (Q7, Fe, AY)

681-Q. Effect of Prior Repeated Stressing on the Fatigue Life of 75S-T Aluminum. Thomas J. Dolan and Herbert F. Brown. *American Society for Testing Materials,* Preprint 91, 1952, 8 pages.

Damage produced in 75S-T Al alloy by repeated loading at one stress amplitude was measured by relative reduction of fatigue life when the specimen was retested at a second stress level. Specimens were pre-stressed at one of three selected stress levels and then tested to failure at a fourth or "test stress" level. (Q7, Al)

682-Q. An Investigation of the Coaxing Effect in Fatigue of Metals. G. M. Sinclair. *American Society for Testing Materials,* Preprint 92, 1952, 9 pages.

Fatigue resistance of some metals may be improved by understressing followed by gradually increasing the amplitude of the alternating stress in small increments, a procedure ordinarily called "coaxing". A study was made of the effect of various coaxing procedures on fatigue resistance of ingot iron, SAE 1045 and 2340 steels. 75S-T6 Al alloy, and an-

nealed 70-30 brass.
(Q7, Fe, CN, AY, Al, Cu)

683-Q. The Anisotropy of the Fatigue Properties of SAE 4340 Steel Forgings. J. T. Ransom and R. F. Mehl. *American Society for Testing Materials*, Preprint 93, 1952. 9 pages.

Studied statistically using heats which showed both high and low transverse average tensile reduction of area. Concludes that the anisotropy of fatigue properties, like the anisotropy in reduction of area, is determined to a large part by presence of fragmented stringer-type inclusions. (Q7, AY)

684-Q. Fatigue of 76S-T61 Aluminum Alloy Under Combined Bending and Torsion. William N. Findley. *American Society for Testing Materials*. Preprint 97, 1952, 16 pages.

Data for several combinations of bending and torsion. The special fatigue equipment for these tests. Fatigue data in torsion are presented for two different types of fatigue machines and results of static tests are tabulated. Literature on effect of combined stress in fatigue is reviewed and the results of the present series are compared with various theories. A possible correction for anisotropy, and energy theories of fatigue under combined stress. 49 ref. (Q7, Al)

685-Q. Prediction of Creep Curves From Stress-Strain Data. Yoh-Han Pao and Joseph Marin. *American Society for Testing Materials*, Preprint 141, 1952. 7 pages.

Develops a method for predicting tension creep-time relations for constant stresses from tensile stress-strain relations at various strain rates. The method was applied to test data obtained using plexiglas, and agreement between actual and predicted creep-time curves was found to be good. (Q3)

686-Q. An Electron Microscope Study of the Development of Fatigue Failures. W. J. Craig. *American Society for Testing Materials*, Preprint 167, 1952, 13 pages.

A pictorial comparison is made of deformation marks on the surface of α-brass, ingot iron, and Al under both static and repeated loading. Under static loading, deformation is a general process taking place in all crystals, while under conditions of repeated loading, deformation is an extremely localized phenomenon taking place in a few crystals or portions of crystals. (Q7, Cu, Fe, Al)

687-Q. Damping, Elasticity, and Fatigue Properties of Temperature-Resistant Materials. B. J. Lazan and L. J. Demer. *American Society for Testing Materials, Proceedings*, v. 51, 1951, p. 611-646; disc., p. 647-648.

Above properties of several temperature-resistant materials were investigated in rotating cantilever-beam testing equipment. The room and elevated-temperature tests were designed to reveal changes in damping energy and dynamic modulus of elasticity during constant cyclic-stress fatigue tests at engineering stress levels. Usual S-N fatigue curves are presented in addition to a series of new diagrams designed to show effects of both stress magnitude and stress history on damping and elasticity properties. Two methods for comparing damping energies of a group of materials. Diagrams facilitate comparison of elasticity properties of materials tested at a given temperature.
(Q21, Q7, Q8, SG-h)

688-Q. Planning and Interpretation of Fatigue Tests. Alfred M. Freudenthal. *American Society for Testing Materials*, "Symposium on Statistical Aspects of Fatigue", 1952, p. 3-13; disc., p. 14-22, 59-64.

Significance of scatter of results of fatigue tests and inadequacy of conventional procedures for their planning and interpretation. An attempt is made to derive the cumulative frequency distribution function of fatigue life at any particular stress amplitude from considerations of statistical theory. Results of rotating-beam and reversed torsion-fatigue tests on steel, Al, and Cu, when represented on logarithmic-normal probability paper, are shown to approximate the theoretically derived distribution. From the plotted cumulative distributions of fatigue life of Al at a number of stress amplitudes, a complete, 3-dimensional S-N-P relation is obtained. 15 ref. (Q7, ST, Al, Cu)

689-Q. On the Statistical Nature of Fatigue. Foster B. Stulen. *American Society for Testing Materials*, "Symposium on Statistical Aspects of Fatigue", 1952, p. 23-40; disc., p. 41-44, 59-64.

Several methods are proposed for determination of fatigue life and endurance limits. Results of tests utilizing these techniques as well as methods of graphically representing the data. The elementary theory of extreme values as related to size effect. Explanation of the understressing effect and of variation in notch sensitivity between different materials are proposed. 19 ref. (Q7)

690-Q. Statistical Analysis of Fatigue Data. Robert Plunkett. *Ameri-*

can Society for Testing Materials, "Symposium on Statistical Aspects of Fatigue", 1952, p. 45-54; disc., p. 54-64.

Follows Weibull's approach. Typical data are tabulated, charted, and discussed. Conclusions are summarized. (Q7)

691-Q. Crushing Strength of Steel Pipe Lined and Coated With Cement Mortar. Leslie Paul and Owen F. Eide. *Journal, American Water Works Association,* v. 44, June 1952, p. 525-530.

Experiments on 49-in. diam. pipe indicate dependability of the von Mises formula as applied to collapse from external pressure of large-diameter steel pipe with closed ends. Customary thicknesses of portland cement mortar of ¾ in. for coatings and ½ in. for lining strengthen 36-in. diam. steel pipe against collapse from external pressure by at least 600%. (Q23, CN)

692-Q. Gears of Ductile Iron Tested. Bayo Hopper. *Automotive Industries,* v. 107, July 1, 1952, p. 37, 86, 88, 90.

Testing procedures for above and results of inspection for wear and other effects. (Q general, Q9, CI)

693-Q. Errors in Stress Determination at the Free Boundaries of "Frozen Stress" Photoelastic Models. V. M. Hickson. *British Journal of Applied Physics,* v. 3, June 1952, p. 176-181.

Magnitude of errors. Case of a stress concentration, where small radii will introduce errors negligible at other points on the boundary. Diagrams. (Q25)

694-Q. Correlation of Fatigue Strength in Bending and Direct Stress. P. G. Forrest and H. J. Tapsell. *Engineering,* v. 173, June 13, 1952, p. 757-758. (A condensation.)

Results in both bending and direct stress on a normalized 0.24% C steel at 400° C., and a fully softened Al alloy, R.R. 58, at 200° C., both of which are structurally stable at the respective temperatures. Dynamic stress-strain curves were obtained and results were correlated. Tables and graphs. (Q7, CN, AY)

695-Q. Ship Research. S. Livingston Smith. *Institution of Mechanical Engineers, Proceedings,* sec. A, v. 166, no. 1, 1952, p. 48-63.

Previously abstracted from *Engineering.* See item 280-Q, 1952. (Q25, K9, CN)

696-Q. Some Factors Affecting Wear on Cemented Carbide Tools. E. M. Trent. *Institution of Mechanical Engineers, Proceedings,* sec. A, v. 166, no. 1, 1952, p. 64-70; disc., p. 70-74.

Previously abstracted from *Engineer.* See item 64-Q, 1952. (Q9, C-n)

697-Q. Plastic Flexure on Mild Steel Beams of Rectangular Cross-Section. K. K. Shackell and J. H. Welsh. *Institution of Mechanical Engineers, Proceedings,* sec. A, v. 166, no. 1, 1952, p. 112-119; disc., p. 119-122.

Tests on a 0.28% C steel in tension and compression and in plastic flexure to determine the shape of the stress-strain curve immediately after the initial yielding, and to determine whether the upper yield stress can be relied upon as a criterion of design. Graphs and diagrams. (Q23, CN)

698-Q. How Good is 80B30? Temper Brittleness, Fatigue and Low Temperature Impacts Studied. R. N. Imhoff and James W. Poynter. *Iron Age,* v. 169, June 26, 1952, p. 102-107.

Air Force tests on above boron steel. Data summarized in tables and graphs. (Q23, Q6, Q7, AY)

699-Q. Conical Surfaces of Fracture Produced by Asymmetrical Impulsive Loading. John S. Rinehart and John Pearson. *Journal of Applied Physics,* v. 23, June 1952, p. 685-687.

Origin of conical fracture surface in thick-walled cylinders loaded through use of internal explosive charges. The angle of fracture associated with these conical surfaces was used to measure velocity of propagation of stress waves in low-carbon steel, brass, Cu, Pb, and Al. Tables, diagrams, and photographs. (Q26, CN, Cu, Pb, Al)

700-Q. The Change of the Elastic Constants of β-Brass With Composition. H. Jones. *Journal of Applied Physics,* v. 23, June 1952, p. 697.

Effects of ion-ion interactions or shear constants and bulk modulus and Fermi-energy phenomena. (Q21, Cu)

701-Q. Some Observations on the Deformation of Polycrystalline Zinc. J. A. Ramsey. *Journal of the Institute of Metals,* v. 80, Dec. 1951, p. 167-171.

Polycrystalline Zn, when deformed, behaves in a similar way to Al in that, both at elevated temperature and at slow strain rates, it tends to form a subgrain or cell structure within the grains. Evidence is presented in support of the view that the cell structure is produced directly by deformation and cannot be adequately explained by the same mechanism as that suggested for polygonization. 14 ref. (Q24, Zn)

702-Q. Some Metallographic Observations on the Fatigue of Metals. P. J. E. Forsyth. *Journal of the Institute of Metals,* v. 80, Dec. 1951, p. 181-186.

Metallographic investigation of ef-

fects of cyclic stresses on microstructure of an Al ½% Ag alloy showed that factors other than simple slip are involved in the mechanism of fatigue at room temperature. There is evidence of a recovery process associated with formation of deformation bands and crystallites during fatiguing of the metal, and it is suggested that observed anomalies in effect of stress concentration on crack progress are the result of crystallite formation at the roots of the cracks. 12 ref. (Q7, Al)

703-Q. Observations on the Tension Texture of Aluminum. E. A. Calnan and Betty E. Williams. *Journal of Metals,* v. 4, July 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 743-744.

Three Al specimens were examined in detail, one of cold rolled high purity rod (99.99%), and two of commercial extruded rod (99.4%). Results of tests on annealed material. (Q24, Al)

704-Q. Preferred Orientations in Vanadium. Carl J. McHargue and Joseph P. Hammond. *Journal of Metals,* v. 4, 1952, July 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 745-746.

The cold rolled and the recrystallized wire textures, and the cold rolled and the recrystallized sheet textures for V. Results show that the textures in V are not significantly different from those reported for other body-centered-cubic metals. Diagrams. 13 ref. (Q24)

705-Q. Steam Pipe Materials for Advanced Steam Conditions. D. W. Crancher. *Machinery Lloyd* (Overseas Ed.), v. 24, June 7, 1952, p. 69, 71, 73, 75-85.

Four steels cover a range of temperatures up to 1050° F. These are plain carbon steel and three low-alloy steels containing Mo, Cr, and V. Resistance to creep and corrosion, stability of the microstructure, and suitability for manufacturing and welding. An appendix gives notes on creep of metals and creep testing. (Q3, R4, CN, AY)

706-Q. Investigation of Statistical Nature of Fatigue Properties. E. Epremian and R. F. Mehl. *National Advisory Committee for Aeronautics,* Technical Note 2719, June 1952, 119 pages.

Statistics of fatigue-fracture curves and endurance limits were determined for a variety of materials and, by analysis of these experimental results, effects of some metallurgical factors on the statistical nature of fatigue properties are shown. Inclusions play a dominant role and other factors such as composition and microstructure are of secondary importance. A number of other aspects of the problem were studied, namely, dependence of statistical variations in fatigue life on stress level in the fracture range, statistics of location of crack initiation, size effect and understressing effect from a statistical viewpoint, and form of the S-N diagram and method of plotting it. Materials tested were Armco iron and SAE 1050 and 4340 steels. 50 ref. (Q7, Fe, CN, AY)

707-Q. Influence of Structure on Properties of Sintered Chromium Carbide. H. J. Hamjian and W. G. Lidman. *National Advisory Committee for Aeronautics,* Technical Note 2731, June 1952, 21 pages.

Results show that room-temperature strength and hardness are influenced by stages of sintering, which are defined by grain size and by number, size, location, and shape of pores. It was found that coarse-grained structures are detrimental to room-temperature strength, but perhaps not at elevated temperatures. (Q23, Q29, H15, Cr, C-n)

708-Q. The Formation of Immobile Dislocations During Slip. A. H. Cottrell. *Philosophical Magazine,* ser. 7, v. 43, June 1952, p. 645-647.

Mathematical approach. Lomer's reaction, a second reaction, an alternate reaction sequence, and work hardening. (Q24)

709-Q. An Electron-Microscope Study of the Effect of Temperature and Strain-Rate on the Mechanism of Deformation of Aluminium. R. I. Garrod, J. W. Suiter, and W. A. Wood. *Philosophical Magazine,* ser. 7, v. 43, June 1952, p. 677-685.

Electron-microscope observations show that there are three basic stages in the mechanism of deformation of metals. Interpretation of these experimental observations, in terms of structural changes, and their possible relationship to the dislocation theory of deformation. Diagrams. 10 ref. (Q24, Al)

710-Q. (French.) **Measuring the Young's Modulus of Metal Bars by an Electromagnetic Method.** Jean Savornin and Georges Renucci. *Comptes Rendus hebdomadaires des Séances de l'Academie des Sciences,* v. 234, May 19, 1952, p. 2045-2046.

Experimental arrangement. The

method can also be applied to nonmagnetic rods. Results for a Cd bar. (Q21, Cd)

711-Q. (French.) **Fundamental Experiments in the Fracture of Solids.** A. Guinier. *Métaux: Corrosion—Industries,* v. 27, Apr. 1952, p. 150-155.

Reviews complex phenomena on the basis of the literature. Calculation of cohesion in ionic crystals; measurement of surface tension of solids; the role of defects; and the work of Griffith, Joffé, Smekal, and Orowan. 15 ref. (Q26, P10)

712-Q. (French.) **Contribution of the Method of Rheo-Electric Analogies to Calculation of Stresses.** L. Malavard. *Métaux: Corrosion—Industries,* v. 27, Apr. 1952, p. 169-184.

Reviews possibilities and applications of above method on the basis of the literature. Basic principles, determination of total stresses, torsion in simple and rectangular bars, and determination of stresses in an elastic plane. Diagrams and illustrations. (Q25)

713-Q. (German.) **Rheological Consideration of Creep of Steel.** Hans Umstätter. *Archiv für das Eisenhüttenwesen,* v. 23, Mar./Apr. 1952, p. 119-124; disc., p. 124-126.

Proposes the application of rheology, particularly its concepts of ductility and relaxation, to creep of various substances. Compares results of tensile tests, compression tests, and notched-bar, impact-bending tests on bituminous asphalt with those obtained on steel wire. Interpretation of the results. Tables and graphs. 14 ref. (Q3, ST)

714-Q. (German.) **Joining of Sintered Bodies to Compact Metals.** Wilhelm Hofmann and Ernst Schmalenbach. *Archiv für das Eisenhüttenwesen,* v. 23, Mar./Apr. 1952, p. 135-142; disc., p. 142-143.

Experimental set-up and types of rods used for tensile tests and shearing tests on compound sintered bodies. Four types of Fe powder compacts were used in the tests. Influence of pressure, sintering temperature, and sintering time. Results of metallographic investigation of the test specimens, especially the effect of Cu additions to Fe powder. Graphs, micrographs, diagrams, and photographs. 13 ref. (Q27, Q2, H general, M27, Fe)

715-Q. (German.) **Measurement of Tensile Stress, Rolling Pressure, and Rolling Work by Means of Electrical Strain Gages.** Kurt Fink and Werner Lueg. *Archiv für das Eisenhüttenwesen,* v. 23, Mar./Apr. 1952, p. 151-156.

Experimental apparatus. Results of tensile and cold rolling tests; application of the method in industry. Diagrams, tables, and graphs. 10 ref. (Q25, F23)

716-Q. (German.) **Practical Stress Analysis With Electrical Strain Gages.** Otto Krisement. *Archiv für das Eisenhüttenwesen,* v. 23, Mar./Apr. 1952, p. 157-161.

Computation of elongations in stress values; graphic, nomographic, mechanical, and electrical processes for interpreting these values. Some devices used for this purpose. Diagrams. (Q25)

717-Q. (German.) **Creep Limit and Its Relationship to Other Mechanical Properties From the Point of View of Physics.** Albert Kochendörfer. *Archiv für das Eisenhüttenwesen,* v. 23, May-June 1952, p. 183-191; disc., 191-192.

The plastic behavior of monocrystals, such as slip, rate of solidification, and the significance of displacements. Proposes application of the same laws to polycrystals. Possibility of influencing the creep curve, and thus the creep resistance. Data for a variety of ferrous and nonferrous metals. Graphs and tables. 57 ref. (Q3)

718-Q. (German.) **Reciprocal Relationship Between Stress and Deformation Gradients. Part 3. Notch Strength.** Franz Bollenrath and Alex Troost. *Archiv für das Eisenhüttenwesen,* v. 23, May-June 1952, p. 193-201.

Proposes a calculation method for notch-effect values. Relationship between notch sensitivity and resistance to plastic deformation. Largely theoretical and mathematical, with graphical interpretation. 17 ref. (Q23)

719-Q. (German.) **The Alternating-Bending Strength of Nitrided Specimens of Varying Diameter.** Karl Wellinger and Paul Gimmel. *Archiv für das Eisenhüttenwesen,* v. 23, May-June 1952, p. 203-205.

Investigation was done on specimens with diameters of 5, 6.5, and 8 mm., of nitrided steel, containing 34% Cr and 6% Al. Tables, charts, and macrographs. (Q5, SS)

720-Q. (German.) **Further Investigations and Observations on Cold Working.** F. H. Müller. *Kolloid Zeitschrift,* v. 126, May 1952, p. 65-72; disc., p. 72.

The deforming process is shown to be irreversible and is ascribed to forced transpositions, corresponding to visco-elastic hysteresis comparable to magnetic hysteresis. Graphs. 14 ref. (Q24)

721-Q. (German.) **Deformability of Slag Inclusions in Steel and Its Significance in Evaluation of Forgings.** Erich Scheil and Rudolf Schnell. *Stahl und Eisen,* v. 72, June 5, 1952, p. 683-687.

Difference between behavior of oxide and sulfide inclusions upon deformation. Dependence of deformability of oxide inclusions on temperature. Determination of degree of deformation of sulfide inclusions, and of forging temperature from deformation of the silicates. Graphs, tables, and photomicrographs. (Q23, F22, ST)

722-Q. (German.) **Radiographic Stress Measurements of Individual Crystals of Steel Under Tensile Stress.** Gerhard Frohnmeyer and Ernst-Günter Hofmann. *Zeitschrift für Metallkunde,* v. 43, May 1952, p. 151-158.

Describes method of oblique exposure for making radiographs of crystals. Results of measurements on pure ferrite, and on ferritic-pearlitic surfaces. Tables, graphs, and micrographs. 14 ref. (Q25, M26, ST)

723-Q. (Russian.) **Thermodynamic Considerations in the Resistance to Plastic Deformation of Two-Phase Metallic Alloys.** K. A. Osipov and B. P. Stoiukhim. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Mar. 21, 1952, p. 439-442.

Theoretical, mathematical analysis. (Q24)

724-Q. (Russian.) **The Law of Static Friction.** S. B. Ratner. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Mar. 21, 1952, p. 443-446.

Friction tests were made on rubber with metals, plexiglas, and other materials. Coefficient of friction was found to change with a change of the load. Data are charted. (Q9)

725-Q. (Russian.) **Evolution of Heat During Plastic Deformation.** N. S. Fastov. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Apr. 21, 1952, p. 851-855.

A mathematical discussion in relation to type of deformation (tension or torsion). By means of the equations derived, energy converted to heat, energy due to residual stress, and energy due to work hardening may be calculated. (Q24, P10)

726-Q. (Russian.) **Method of Determining the Regularity of the Change of Hardness and α-and γ-Phases of Steel During Heating to 1100° C. in a Vacuum.** M. G. Lozinskii. *Doklady Akademii Nauk SSSR,* new ser., v. 84, May 1, 1952, p. 63-66.

Experiments were made on hot hardness of low-carbon steel. Equipment and charted data. (Q29, CN)

727-Q. (Russian.) **The Influence of Cracks on the Mechanical Properties of Materials in Various Stress States.** Ia. B. Fridman, T. K. Zilova, and N. I. Zhukova. *Doklady Akademii Nauk SSSR,* new ser., v. 84, May 1, 1952, p. 67-70.

Various combinations of torsion, tension, and compression (in sequence) were used in tests on hardened steel specimens. Data are charted. Macrographs illustrate fractured pieces. (Q27, Q28, Q1, CN)

728-Q. (Russian.) **Influence of the Thickness of the Babbitt Layer on Its Wear in Bearings.** S. E. Gurevich. *Doklady Vsesouiznoi Ordena Lenina Akademii Sel'skohoziaistvennykh Nauk imeni V. I. Lenina,* v. 17, No. 1, 1952, p. 44-47.

Tests and test equipment. Data are tabulated and charted. (Q9, SG-c, Sn, Pb)

729-Q. (Russian.) **The Nature of "Naphthalenic" (Coarse - Grained, Transcrystalline) Fracture in High Speed Steel.** V. D. Sadovskii, K. A. Malyshev, and N. V. V'ial. "Izvestiia Sektora Fiziko-Khimicheskogo Analiza", v. 20 (Academy of Sciences of the USSR), p. 345-350.

An experimental investigation. Data are tabulated and illustrated. (Q26, M27, TS)

730-Q. (Russian.) **Wear Resistance of Metal-Cutting Machine Guides.** V. A. Ambarov. *Stanki i Instrument,* v. 23, Jan. 1952, p. 21-24.

Results of experimental investigation for a number of different steels and cast irons. Tables and graphs. (Q9, G17, CI, ST)

731-Q. (Swedish.) **Volume Sensitivity of Gray Cast Iron.** Gustav Meyersberg. *Gjuteriet,* v. 42, May 1952, p. 71-82.

Variation of strength of specimens. Volume sensitivity of gray cast iron and the so-called rim or skin effect were studied. Diagrams and graphs. 12 ref. (Q23, P10, CI)

732-Q. More Thoughts on Fatigue. P. Litherland Teed. *Aeroplane,* v. 82, June 27, 1952, p. 787-790.

Some interesting methods for increasing the fatigue life of aircraft structures include development and exploration of residual stresses and mechanical production of surface compressive stresses. Data are tabulated. 18 ref. (Q7, Q25)

733-Q. Mechanical and Physical Properties of Aluminium Cast Iron. J. W. Bampfylde. *British Cast Iron Research Association Journal of Research and Development,* v. 4, June 1952, p. 340-359.

Development of a scale and growth resisting cast iron ("Cralfer"). Special treatment was developed to overcome the tendency of Al irons to oxidize. Details of microstructure. Covers Al cast irons without alloy additions; and Al cast irons with low and with high Cr contents. Graphs, photomicrographs, and tables.
(Q general, P general, M27, CI)

734-Q. Instrumentation. Ralph H. Munch. *Industrial and Engineering Chemistry,* v. 44, July 1952, p. 65A-66A, 68A.

A bonded-wire-type strain gage which will measure simple pickups for pressure, load, and torque. Schematic diagrams. (Q25, S18)

735-Q. Boundary Slip in Bicrystals of Tin. K. E. Puttick and Ronald King. *Journal of the Institute of Metals,* v. 80, June 1952, p. 537-544.

Specimens of Sn consisting of two crystals meeting in a straight boundary were stressed in shear to cause relative movement of the crystals at the boundary. Relation between relative movement and time under steady stress was examined at a number of stresses and temperatures, for a standard type of specimen in which the *c*-axes of the crystals were at right angles to one another and at 45° to the boundary. Appendixes give information on growth of crystals and conditions for straight boundaries, and on grain-boundary surfaces. Diagrams, graphs, macro and micrographs. 15 ref. (Q24, M27, M28, Sn)

736-Q. X-Ray Diffraction Studies in Relation to Creep. G. B. Greenough, Catherine M. Bateman, and Edna M. Smith. *Journal of the Institute of Metals,* v. 80, June 1952, p. 545-550.

To investigate a hypothesis regarding the mechanism of creep put forward by Greenough and Smith, two Al-Ag alloys, one a solid solution and the other containing a precipitate, were examined. Experiments were also carried out on recovery of specimens quickly pulled at either 20 or 300° C. Tables and X-ray photographs. 18 ref.
(Q3, M22, Al)

737-Q. Electric Resistance Strain Gages. J. A. Sweeney Jr. and D. K. Schaeve. *Machine Design,* v. 24, July 1952, p. 224-226, 228-230.

Operation of bonded-wire strain gages. (Q25)

738-Q. Evaluating Mechanical Shock Resistance. Bernard Goldberg and T. E. Pardue. *Machine Design,* v. 24, July 1952, p. 236-238, 241.

Methods and apparatus for measuring resistance of materials to mechanical shock were studied in the Naval Research Laboratory. Test materials used were a group of sand-cast Al alloys of special interest to the Navy. (Q6, Al)

739-Q. High Tensile Beta Brass. A. R. Bailey. *Metal Industry,* v. 80, June 27, 1952, p. 519-522, 526.

An investigation of intercrystalline weakness. Twelve different alloys containing 50.71-63.35% Cu, 28.13-48.93% Zn, 0-20.5% Al, 0-1.94% Mn, 0-2.10% Fe, 0-0.45% Sn, and 0-1.02% Ni were examined for microstructure and tensile properties. Tables and micrographs. 12 ref.
(Q27, M27, Cu, Zn)

740-Q. A Survey of High-Temperature Materials. J. M. Robertson. *Metal Treatment and Drop Forging,* v. 19, June 1952, p. 275-283.

Mechanical properties of metals at high temperatures and types of alloys available for use between 450 and 950° C. Precipitation hardening. Numerous graphs. (To be continued) (Q general, J27, SG-h)

741-Q. The Creep and Fatigue Properties of Two Commercial Aluminium Bronzes at 500° C. J. J. Carter, D. N. Mends, and J. McKeown. *Metallurgia,* v. 45, June 1952, p. 273-281.

The alloys are used in tubular heat exchangers for gas turbines. Scaling behavior; creep, stress-rupture time, and fatigue tests in both cold worked and annealed conditions; structure after these tests; effect of grain size on creep resistance of the annealed materials; and changes when held at 500-600° C. for long periods without applied stress. Structure and mechanical-property data on the as-received materials. Graphs, tables, and photomicrographs. (Q3, Q7, Cu)

742-Q. The Influence of Shot Peening on the Fatigue Properties of Steel. W. J. Harris. *Metallurgia,* v. 45, June 1952, p. 299-300.

Experimental results on various steels. Examples where beneficial effects are obtained. Tables.
(Q7, G23, CN, ST)

743-Q. Equipment for Creep Testing at Temperatures up to 200° C. R. J. M. Payne. *Metallurgia,* v. 45, June 1952, p. 322-324.

The time taken in adjusting the temperature and temperature uniformity of creep-test specimens, particularly at temperatures below 200° C., is greatly reduced by oil-bath heating of the test pieces. The equipment enables six tests to be carried out simultaneously at the

same temperature. Photograph and apparatus diagrams. (Q3)

744-Q. The Flow of Polycrystalline Metals Under Simple Shear. E. N. da C. Andrade and K. H. Jolliffe. *Proceedings of the Royal Society,* ser. A, v. 213, June 5, 1952, p. 3-26.

Creep of three polycrystalline metals—commercial Pb, pure Pb, and Cd—were investigated under conditions of simple shear, by a method in which a constant couple is applied to an annulus cut in a thicker disk of the metal. For comparison, normal tensile tests were carried out on wires of the same metals. Cause of the elimination of permanent creep under the conditions of simple shear, and a variety of experimental results explained in terms of intracrystalline and boundary effects. Numerous graphs and tables. 11 ref. (Q3, Q2, Pb, Cd)

745-Q. A Critical Look at Fatigue Equations. E. H. Schuette. *Product Engineering,* v. 23, July 1952, p. 150-151.

Empirical fatigue equations are unreliable and often misleading. This is demonstrated by application of four such equations to test data for a Mg alloy. Values of the endurance limit range from 0 to 19,000 psi. for the same material, depending on which of the four equations is used. (Q7, Mg)

746-Q. (Book) **Symposium on Statistical Aspects of Fatigue.** 64 pages. 1952. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. (Special Technical Publication 121.)

Introduction by R. E. Peterson plus three papers and accompanying general and specific discussions. Papers are separately abstracted. (Q7)

747-Q. (Book—German.) **Die Prüfung Metallischer Werkstoffe.** (Testing of Metallic Materials), Kurt Matthaes. 210 pages. 1952. Metall-Verlag, G.m.b.H., Berlin-Grunewald, Germany. 15 DM.

A classified collection of many different methods of physical and mechanical testing, corrosion tests, and inspection methods. Bibliography and subject index.
(Q general, P general, R11, S general)

748-Q. The Mathematical Theory of Stationary Dislocations. F. R. N. Nabarro. *Advances in Physics,* v. 1, July 1952, p. 269-394.

Dislocations in an elastic continuum and effect of the crystal structure. Diagrams and graphs. 111 ref. (Q21, M26)

749-Q. The Nature, Origin, and Effects of Residual Stresses. R. G. Treuting. *American Society for Metals,* "Residual Stress Measurements", 1952, p. 1-41.

Reviews the multiplicity of effects residual stresses exert on metallic properties, altering electrical conductivity, magnetic permeability and magnetostriction, chemical potential and reactivity, phase transformations, precipitation, plastic deformation, work hardening, fatigue, creep, elastic and plastic after-effects, recovery and recrystallization, internal friction and elastic properties, mechanical strength and fabrication qualities, and dimensional stability. 50 ref.
(Q25, P general, Q general, N general)

750-Q. The Measurement of Residual Stresses. J. J. Lynch. *American Society for Metals,* "Residual Stress Measurements", 1952, p. 42-96.

Some of the more popular methods of residual-stress determination with emphasis on limits of application and accuracy of the results obtained from each technique. Diagrams and graphs. 55 ref. (Q25)

751-Q. Residual Stress States Produced in Metals by Various Processes. H. B. Wishart. *American Society for Metals,* "Residual Stress Measurements", 1952, p. 97-128.

Residual-stress states which may be produced by both cooling in air and slow cooling from above room temperature, as well as by quenching and tempering, cold working, grinding, carburizing, and nitriding. Typical results for steel components are charted. 17 ref.
(Q25, J general, ST)

752-Q. Relief and Redistribution of Residual Stresses in Metals. D. G. Richards. *American Society for Metals,* "Residual Stress Measurements", 1952, p. 129-204.

Ways of producing a favorable distribution of residual stress; in other words, shop methods for relieving and inducing residual stresses. Ways in which unfavorable redistribution may occur during fabrication and changes in residual stress which take place during service. Diagrams and graphs. 156 ref. (Q25, G general, J1)

753-Q. A Castable Polyester Resin for Photoelastic Work. B. Sugarman, G. O. Moxley, and I. A. Marshall. *British Journal of Applied Physics,* v. 3, July 1952, p. 233-237.

Requirements for 3-dimensional model-making plastics. Faults of the few materials used to date. Intro-

duction of a cross-linked polyester resin, readily available, into this field permits further investigations to be conducted. The chemical and physical properties of this new resin, and a theory explaining the "frozen" effect. (Q25)

754-Q. Welds in Machine Constructions. W. M. Halliday. *Canadian Metals,* v. 15, July 1952, p. 40, 42.

Various mechanical properties of the welds. (Q general)

755-Q. The Effect of Certain Metallic Impurities on the Properties of Zamak 3-Type Zinc-Base Die Casting Alloys. R. C. Bell, J. O. Edwards, and J. W. Meier. *Canadian Mining and Metallurgical Bulletin,* v. 45, July 1952, p. 404-412; disc., p. 412-413; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 55, 1952, p. 262-270; disc. p. 270-271.

Effects of Pb, Cd, Sn, Cu, or In, or combinations, on mechanical properties and dimensional stability. Tests were made under varied conditions of temperature and aging. Apparatus diagram, tables, photographs, and graphs. 21 ref.
(Q general, P10, E13, Zn)

756-Q. Creep of Annealed High-Purity Copper. W. D. Jenkins and T. G. Diggers. *Industrial Heating,* v. 19, July 1952, p. 1212, 1214, 1354.

See abstract of "Creep of Annealed and Cold-Drawn High-Purity Copper." *Journal of Research of the National Bureau of Standards;* item 51-Q, 1952. (Q3, Cu)

757-Q. Creep Buckling of Columns. Charles Libove. *Journal of the Aeronautical Sciences,* v. 19, July 1952, p. 459-467.

Creep of a slightly crooked H-section column carrying a constant load was studied theoretically. The analysis is intended for any material having creep properties of the same form and for which the constants are known. Applicability to 75S-T Al alloy at 600° F. and low-alloy steel at 800 and 1100° F.
(Q3, Al, AY)

758-Q. Effect of Strain-Temperature History on the Flow and Fracture of Ingot Iron at Low Temperatures. Glenn W. Geil and Nesbit L. Carwile. *Journal of Research of the National Bureau of Standards,* v. 48, June 1952, p. 399-406.

A study was made to determine the effect of the strain-temperature history of ingot iron on true stress-strain relationship for specimens extended in tension at −196° to 100° C. Tables and graphs. 12 ref.
(Q27, Fe)

759-Q. Rare Earth Metals Improve Elevated Temperature Properties of Magnesium Castings. J. C. McDonald. *Materials & Methods,* v. 36, July 1952, p. 162, 164, 166.

See abstract of "Use of Rare Earth Metals in Magnesium Casting Alloys", *Light Metal Age;* item 109-Q, 1952.
(Q general, E25, SG-h, Mg)

760-Q. Distortion and Service Tests of Carburized Gears Made of Boron Steels. (Concluded.) S. L. Widrig and Wilson T. Groves. *Metal Progress,* v. 62, July 1952, p. 75-78.

Results of a test program, with information on heat treatments; on fatigue and chipping tests. Deals with 80B17, 80B20, 8620, 8123, and 94B17 steels. Table and graphs.
(Q general, J26, S21, AY)

761-Q. Slip Planes and the Energy of Dislocations. B. Chalmers and Ursula M. Martius. *Proceedings of the Royal Society,* ser. A, v. 213, June 24, 1952, p. 175-185.

The characteristic slip directions and planes in metal crystals can be explained and predicted by taking into account the dependence of the energy of a dislocation on its plane. The reason for the existence of alternative slip systems, particularly at high temperatures. Tables and diagram. 29 ref. (Q24, M26)

762-Q. Analysis of Localized Stresses in Drilled Calender Rolls. James T. Bergen. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 2, 1952, p. 13-20.

Localized stresses occurring at heat-transfer-fluid ducts of a large calender roll were investigated by means of a photo-electric model. (Q25)

763-Q. Experimental Study of the Transverse Impact of a Mass on a Column. William H. Hoppmann. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 2, 1952, p. 21-30.

Results of an experimental investigation of response of columns to impact from a solid sphere. Three columns were tested. Comparison is made between theoretical and experimental results. (Q6)

764-Q. Model Arches in the Flexible Range-Testing Technique. Robert S. Rowe and Sidney Shore. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 2, 1952, p. 31-42.

Methods and test equipment used to measure moments and thrusts in flexible model arches. Diagrams, graphs, and illustrations. (Q25)

765-Q. X-Ray Stress Measurements. C. W. Tucker, Jr., and H. V. Anderson. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 2, 1952, p. 67-74.

Methods, theory, and technique. Typical data for various metals and fabrication processes are charted. (Q25)

766-Q. A Study of Fatigue in Metals by Means of X-Ray Strain Measurement. John A. Bennett. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 2, 1952, p. 105-112.

Study was made on SAE 4130 steel. Apparatus, technique, and results. (Q25, Q9, AY)

767-Q. Plastics for Photoelastic Analysis. J. P. Vidosic. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 2, 1952, p. 113-124.

Investigation of some of the newer transparent or translucent plastics, instead of the usual Bakelite. Tables, graphs, diagrams, and photographs of stress patterns in photoelastic test samples. (Q25)

768-Q. Electric Strain Gage Field Analysis of a Foundation Structure. J. C. Ascherman. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 2, 1952, p. 125-132.

Methods and techniques used in application and waterproofing of Baldwin SR-4 type strain gages, for a recent field investigation which required strain measurements within vertical water-filled cylinders 160-170 ft. long. A simple method for retaining the desired sensitivity in an SR-4 portable strain indicator (Type K) when lead-in wires 200 ft. and more in length are used. The methods were evolved and used under severe tropical field conditions. (Q25)

769-Q. Techniques in Residual Stress Analysis. Walter Leaf. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 2, 1952, p. 133-140.

In determination of residual stress by the sectioning method, the metal must be removed in such a manner that no appreciable residual stress is created at the fresh surface. Various methods of metal removal which the author has found satisfactory during several years of analysis. Details of measuring and calculating techniques. (Q25)

770-Q. A Three Dimensional Photoelastic Stress Analysis of a Threaded Drill Pipe Joint. W. F. Franz. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 2, 1952, p. 185-194.

Fundamental theory method of machining models, and testing technique. Two test specimens were made and tested. Results show good agreement when compared with those of actual fatigue tests on steel test specimens. (Q25, ST)

771-Q. Quantitative Evaluation of Residual Stresses by the Stresscoat Drilling Technique. A. G. Tokarcik and M. H. Polzin. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 2, 1952, p. 195-207.

The Stresscoat drilling technique with dye-etchant sensitizer for measuring residual stresses was applied to a Mg casting. Rather large radial crack patterns of uniform size were obtained regardless of the area investigated. The dissection method, consisting of mechanically isolating a small piece with a jeweler's saw, etching off the cold worked layer, and reading the relaxation by strain gages as described by Found, was then applied to the same casting. The results showed negligible residual stresses of a compressive nature. Therefore, the Stresscoat method was investigated further in an attempt to explain the discrepancy in Mg and also to extend the work to Al and steel. (Q25, Mg, Al. ST)

772-Q. Test Bar Design Influences Results on Investment Castings. R. J. Wilcox. *SAE Journal,* v. 60, July 1952, p. 32-36.

Test results are tabulated for cast-to-size and machined-to-size carbon and alloy-steel bars. Results show marked effect of design, which complicates establishment of a standard classification of investment castings according to mechanical properties. (Q general, E15, CN, AY)

773-Q. Hysteresis of Shaft Materials in Torsion. W. P. Welch and B. Cametti. *Transactions of the American Society of Mechanical Engineers,* v. 74, July 1952, p. 753-763; disc., p. 763-764.

Elastic hysteresis tests were limited to those shaft materials that could be supplied in large diameters. Since solid shafts are usually employed in these applications, the tests were conducted on solid specimens, except for one tubular specimen included for the purpose of comparison. Materials tested were SAE 1015 and 4140, K Monel, and Inconel 'X'. Graphs, photographs, tables, and diagrams. 11 ref. (Q21, Q1, CN, AY, Ni)

774-Q. A Time-Temperature Relationship for Rupture and Creep Stresses. F. R. Larson and James Miller. *Transactions of the American Society of Mechanical Engineers,* v. 74, July 1952, p. 765-771; disc., p. 771-774.

Relationship was adapted and ap-

plied to existing data on several widely different ferrous and nonferrous alloys with good results. Methods by which short-time tests can be used to determine long-time properties. Numerous tables and graphs. 15 ref. (Q3, Q4)

775-Q. Effect of Temperature Variation on the Long-Time Rupture Strength of Steels. Ernest L. Robinson. *Transactions of the American Society of Mechanical Engineers,* v. 74, July 1952, p. 777-780; disc., p. 780-781.

A method of computing the factor of safety of a structural member with reference to a stated life while operating under stress at high temperature when the temperature or stress varies moderately according to some definite pattern. Tables and graphs. Data for Timken 16-25-6 steel. (Q4, ST)

776-Q. High-Temperature Stress-Rupture Testing of Tubular Specimens. L. F. Kooistra, R. U. Blaser, and J. T. Tucker, Jr. *Transactions of the American Society of Mechanical Engineers,* v. 74, July 1952, p. 783-791; disc., p. 791-792.

Method was developed in which a tubular specimen under internal steam pressure and at a controlled temperature is tested in stress rupture. Test apparatus and a number of the test results for S49 steel; Croyloys 3M, 9, and 12; and stainless steels 16-13-3, 18-8, 18-8 Cb, and 18-8 Si are discussed in relation to similar data obtained on simple tension specimens. Graphs, tables, and photographs. (Q4, SS, CN, AY)

777-Q. Rupture and Creep Characteristics of Titanium-Stabilized Stainless Steel at 1100 to 1300 F. J. W. Freeman, G. F. Comstock, and A. E. White. *Transactions of the American Society of Mechanical Engineers,* v. 74, July 1952, p. 793-801; disc., p. 801.

Rupture and creep strengths were established at 1100, 1200, and 1300° F. for 18-8 + Ti steel heat treated at 1900 and 2050° F. Several Ti-C ratios were included as a variable. Results are tabulated. Graphs and photomicrographs. (Q3, Q4, SS)

778-Q. Behavior of an Idealized Steel H Column Above the Elastic Range. Walter H. Weiskopf. *Welding Journal,* v. 31, July 1952, p. 353s-360s.

A mathematical method of analyzing H columns bent about the strong axis. Type of failure and magnitude of direct load and bending moments causing it. (Q5, ST)

779-Q. Mechanical Strength and Creep in Metals. N. F. Mott. "Imperfections in Nearly Perfect Crystals" (John Wiley & Sons, New York), 1952, p. 173-190; disc., p. 190-196.

Effects responsible for mechanical strength in metals include dissolved impurities, which may lock dislocations without diffusing to them, as well as impurities after a process of diffusion, as envisaged by Cottrell. Frank's ideas on the strength of pure metals, which depend on the distance between the two locking points of a Frank-Read source, are reviewed. Finally, a theory of exhaustion creep is compared with experiments of Davis and Thompson. (Q23, Q3)

780-Q. The Influence of Dislocations and Impurities on the Damping and the Elastic Constants of Metal Single Crystals. J. S. Koehler. "Imperfections in Nearly Perfect Crystals." (John Wiley & Sons, New York), 1952, p. 197-212; disc., p. 212-216.

The motion of edge-type dislocations which are "pinned down" by impurity atoms is treated for the case of a periodic external stress. An expression for distribution of free lengths of dislocation is obtained. Zero-amplitude decrement and plastic contribution to the elastic constants are calculated. Amplitude dependence is discussed by supposing that some of the dislocations break away from the impurities. The results obtained are in agreement with experiment if the damping force on a dislocation is about 100 times previously suggested values. 15 ref. (Q21, Q8)

781-Q. (French.) **Theories of the Fracture of Metals.** P. Laurent. *Métaux: Corrosion—Industries,* v. 27, May 1952, p. 189-200.

Reviews the above on the basis of the literature. Fracture of monocrystals and polycrystals. Graphs. 14 ref. (Q26)

782-Q. (French.) **Conditions for the Occurrence of Fractures During Creep Tests.** Georges Vida. *Métaux: Corrosion—Industries,* v. 27, May 1952, p. 201-215.

Causes for acceleration of creep and of fracture; and influence of various factors on type of creep fracture, and upon the time required for fracture, and for extension of the fracture. Graphs, micrographs, and 22 ref. (Q3)

783-Q. (French.) **Mechanical Properties of Solids as a Function of Temperature. (Plasticity, Viscosity, and Internal Friction.)** Paul Le Rolland. *Métaux: Corrosion—Industries,* v. 27, May 1952, p. 216-232.

Discussed on the basis of the literature. Treats in particular the perfect crystal at absolute zero, thermal agitation, the imperfect crys-

tal, the migration of atoms, hardening, and the role of internal stresses. 11 ref. (Q22, Q23)

784-Q. (French.) **Considerations on the Modulus of Elasticity and Elastic Limit of Alumina—Aluminum Complexes.** R. de Fleury. *Revue de l'Aluminium,* v. 29, May 1952, p. 183-185.

Recent study by Roland Irmann on sintered, heat resistant Al. Explains, on the basis of theoretical considerations, the peculiar characteristics of above sintered mixture. (Q21, Al)

785-Q. (French.) **A Method for Determining Strains Produced by Electrodeposits With the Aid of Wire Strain Gages.** E. G. Ramachandran and K. V. Chinnappa. *Revue de Métallurgie,* v. 49, Jan. 1952, p. 60-64.

Apparatus and procedure. Details of calculations and results of application of the technique to Ni deposits on steel. 11 ref. (Q25, L17, Ni, ST)

786-Q. (French.) **The Effect of Premature Manipulation of Ingots on the Quality of Rails.** J. G. Platon. *Revue de Métallurgie,* v. 49, June 1952, p. 436-438; disc., p. 438.

Results of such handling, as internal cracks, during customary factory procedure. Suggestions for improving the process. (Q25, F21, ST)

787-Q. (German.) **Roller-Bearing Problems. VDI-Forschungsheft 434 1952.** (Supplement to *Forschung auf dem Gebiete des Ingenieurwesens,* v. 18, sec. B, 1952), 28 pages.

Contains two papers: "The Plastic Behavior of Rotating Steel Rollers Having Point Contact," G. Niemann and K. W. Kraupner; and "Oscillations in Ball and Roller Bearings Having Statically Fixed Supports," Hans Perret. (Q general, ST)

788-Q. (German.) **Hardness Measurements on Electrodeposited Layers.** Albert Keil and Otto Wüst. *Metalloberfläche,* ser. A, v. 6, July 1952, p. A102-A106.

Various apparatus and methods. Sources of errors. Micrographs. (Q29, L17)

789-Q. (German.) **General Considerations on the Testing of Steels for Their Tendency to Brittle Fracture.** Ed. Amstutz. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 18, May, 1952, p. 149-152.

No known tests are capable of supplying absolute values concerning brittle fracture. Warns against using favorable test results for the purpose of disguising production defects. (Q26)

790-Q. (German.) **Temper Brittleness, Its Occurrence, Causes, and Methods for Avoidance.** A. Legat. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 18, May 1952, p. 160-168.

Tests made by various investigators on Cr, Mn, and Si steels. Graphs. (Q23, AY, SS)

791-Q. (German.) **Permanent Hot Hardness of High Speed Steels.** E. Bickel. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 18, May 1952, p. 168-173.

The permanent hot hardness of tungsten high speed steels with various additions of Co, also during normal heat treatment. Results at various temperatures. Graphs. (Q29, J general, TS)

792-Q. (German.) **The Behavior of Materials and Their Welds at Low Temperatures.** Werner Hoffmann. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, June 11, 1952, p. 519-522.

Low-temperature mechanical-property tests down to −195° C. with welded and unwelded carbon and alloy steels indicate that the welds do not materially reduce the strength of the steels. Tables, graphs, and photomicrographs. (Q general, ST)

793-Q. (German.) **Testing Machines.** H. Mintrop. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, July 1, 1952, p. 604-608.

New designs of mechanical-property testing devices. 51 ref. (Q general)

794-Q. (German.) **A Simple Method of Measuring Elastic Constants With the Aid of Ultrasonic Impulses.** A. Lutsch. *Zeitschrift für angewandte Physik,* v. 4, May 1952, p. 166-168.

Method measures the time required for a sound impulse to pass back-and-forth through the specimen. (Q21, S13)

795-Q. (Russian.) **Influence of Surface-Active Materials on Plastic Flow of Polycrystalline Metals.** T. A. Amfiteatrova and B. Ia. Iampol'skii. *Doklady Akademii Nauk SSSR,* new ser., v. 84, May 11, 1952, p. 305-308.

Experiments were made with Al and Cu wires. Various alcohols, sodium dioctyl-sulfosuccinate, and butylstearate, were used as the surface-active agents. Data are charted. (Q24, Al, Cu)

796-Q. The Measurement of Non-Electrical Quantities. G. von Basel. *Engineers Digest,* v. 13, July 1952, p. 219-222. (A condensation.)

Reviews various methods. A trans-

ducer or pick-up arrangement and a special transmission element which enables signals from transducers on rotating parts to be transmitted inductively to stationary elements without using slip rings. Various designs developed include a 4-mm. strain-measuring element as well as torque meters, torsional vibration indicators, and dynamic pressure pickups. Diagrams. (Q24)

797-Q. The Creep of Zinc Single Crystals. L. Slifkin and W. Kauzmann. *Journal of Applied Physics,* v. 23, July 1952, p. 746-753.

Transient creep of single crystals prepared from 99.999% Zn was studied at 35° C. and at strain rates of the order of 10^{-5}. Results are interpreted in terms of recent models of the metallic state. 27 ref. (Q3, Zn)

798-Q. Note on the Strain Aging of Iron Single Crystals. A. N. Holden and F. W. Kunz. *Journal of Applied Physics,* v. 23, July 1952, p. 799.

Several single crystals of high-purity Fe in wire form several inches long and 0.025 in. in diam. were grown for use in internal-friction damping experiments. Tensile tests indicated that these crystals had only very small initial yield points, but were very susceptible to strain aging and exhibited very marked yield-point effects after straining and aging short times at room temperature. Several interesting results are pertinent to a theoretical understanding of the strain-aging phenomenon. Graphs. (Q22, Q8, M26, Fe)

799-Q. The Effect of Zirconium on the Properties and Structure of Superduralumin, With Particular Reference to Forgings. M. Tournaire and M. Renouard. *Journal of the Institute of Metals,* v. 80, July 1952, p. 593-597.

Superduralumin A-U4 GI (Duralumin FR) is frequently used in France for high-strength forgings. However, these forgings, particularly those of large size, are susceptible to quenching cracks and in addition, like forgings of ordinary duralumin, they show considerable variations in grain size in different parts of the same section. It was found that if the Mn content of the alloy is replaced, wholly or partly, by 0.25% Zr, forgings are obtained whose mechanical properties are in no way inferior but which have a fine and uniform grain size. The new alloy can also be cast, by a semicontinuous method, into very large billets with less risk of fissures than with ordinary superduralumin, and it can be forged with greater ease. (Q general, M27, Al)

800-Q. Sixth Hatfield Memorial Lecture: The Flow of Metals. E. N. da C. Andrade. *Journal of the Iron and Steel Institute,* v. 171, July 1952, p. 217-228.

Emphasis on constant stress test methods. Data for various metals are charted. 19 ref. (Q24)

801-Q. Lubrication and the Load-Carrying Capacity of Gears. E. T. Hutt. *Lubrication Engineering,* v. 8, Aug. 1952, p. 180-182, 201-202; disc., p. 202-203.

The functions of oil supply in relation to recognized types of gear failure. The oil is shown to be much more than a mere lubricant in the exact sense of the word. Ways in which operating conditions and choice of lubricating oil can influence scoring and pitting of gears in service. Some research findings concerning influence of oil properties and other factors. 18 ref. (Q9)

802-Q. Reversed-Bending Fatigue Tests on Cable-Sheaths. C. J. Thwaites. *Metal Industry,* v. 81, July 18, 1952, p. 50.

Since the lead normally produced by Broken Hill, Rhodesia, contains approximately 0.02% Ag, an amount which is insufficient for economic recovery, and since this lead will be used in South Africa and probably in other parts of the Commonwealth as a basic material for cable sheathing, it was desired to ascertain the effect of this silver content on fatigue properties of the lead and of alloys made therefrom. Test procedure. Results are tabulated and charted. (Q7, Pb)

803-Q. Plastic Stress-Strain Relations for Combined Tension and Compression. Joseph Martin and H. A. B. Wiseman. *National Advisory Committee for Aeronautics,* Technical Note 2737, July 1952, 61 pages.

Plastic stress-strain relations for biaxial tension-compression principal stresses were determined for a 14S-T4 Al alloy. Constant stress ratio tests provided control data and information on influence of biaxial stresses on yield strength of the material. Variable stress ratio tests were made to determine whether the deformation or flow theory agrees better with actual plastic stress-strain relations, and special tests were conducted to check the validity of various assumptions made in these theories. Data on shear are also given. Tables, diagrams, and graphs. (Q27, Q28, Al)

804-Q. Influence of Chemical Composition on Rupture Test Properties

at 1500° F of Forged Chromium-Cobalt-Nickel-Iron Base Alloys. J. W. Freeman, J. F. Ewing, and A. E. White. *National Advisory Committee for Aeronautics,* Technical Note 2745, July 1952, 69 pages.

62 alloys involving systematic individual variations of 10 elements present in a forged Cr-Co-Ni-Fe base alloy in the solution-treated and aged condition and simultaneous variation of Mo, W, and Cb were rupture-tested at 1500° F. It was found that the elements can be varied individually between quite wide limits without significantly changing the rupture properties. Data on creep rate. Possible mechanism. Photomicrographs, tables, and graphs. (Q4, Fe, Cr, Co, Ni)

805-Q. Preview of Behavior of Grain Boundaries in Creep of Aluminum Bicrystals. F. N. Rhines and A. W. Cochardt. *National Advisory Committee for Aeronautics,* Technical Note 2746, July 1952, 40 pages.

Gliding of Al bicrystals along their mutual boundary was studied during creep tests at 200 to 650° C. and 1 to 100 psi. Photomicrographs, diagrams, graphs, and Laue patterns. 10 ref. (Q3, Al)

806-Q. Photo-Elastic Determination of Boundary Stresses. William Shelson. *Nature,* v. 170, July 12, 1952, p. 82-83.

Improved method and apparatus. (Q25)

807-Q. The Flow of Solids. B. Gross. *Physics Today,* v. 5, Aug. 1952, p. 6-11.

Fundamental principles. (Q24)

808-Q. Effect of Chemistry and Section Size on Properties of Ductile Iron. D. J. Reese, F. B. Rote, and G. A. Conger. *SAE Quarterly Transactions,* v. 6, July 1952, p. 385-394.

Investigations conducted at the University of Michigan under the sponsorship of International Nickel Co., to determine influence of C, Si, and P contents and of section size on the mechanical properties of ductile cast iron. Tables, graphs and photomicrographs. (Q general, CI)

809-Q. Hardness, Elastic Modulus, Wear of Metals. T. L. Oberle. *SAE Quarterly Transactions,* v. 6, July 1952, p. 511-515; disc., p. 516-517.

Proposes a new concept of wear and elastic limit of strain as a practical measure of these properties. Introduces the term "modell," which is defined as Brinell hardness multiplied by 10^6 and divided by elastic modulus. This unit gives an indication of the depth of penetration that a metal can tolerate without exceeding its elastic limit. Graphs and tables and data for a wide variety of ferrous and nonferrous metals and alloys. 11 ref. (Q21, Q29, Q9)

810-Q. Some Phenomena of Engine Wear as Revealed by Radioactive Tracer Technique. H. R. Jackson, F. C. Burk, L. J. Test, and A. T. Cowell. *SAE Quarterly Transactions,* v. 6, July 1952, p. 518-524; disc., p. 524-530.

Effect of operating conditions, lubrication, and fuel on engine wear. Graphs and photographs. (Q9)

811-Q. Current Practice in Tractor Bevel Gears. Wayne H. Worthington and Kenneth J. Harris. *SAE Quarterly Transactions,* v. 6, July 1952, p. 531-546.

Study based upon an analysis of 68 pairs of tractor bevel gears, selected by 10 tractor manufacturers as representative of best current practice. Basic bevel-gear systems in use, based upon method of cutting. Static and maximum tensile stresses, fatigue life analysis, materials, and heat treatment. (Q27, Q7, J general, T7, ST)

812-Q. Strain Gages Check In-Flight Rotor Stress. *Steel,* v. 131, July 28, 1952, p. 77.

Measurement of major strains in helicopter rotor blades while in flight, as done at Piasecki Helicopter Corp. Baldwin SR-4 bonded resistance wire gages are used. (Q25, ST)

813-Q. Steel Drawability Measured in a Minute. *Steel,* v. 131, Aug. 4, 1952, p. 100, 102.

Two instruments developed at Jones & Laughlin give basic steel industry, fabricators, warehousemen, quick method of indicating bend resistance and strain behavior of steel sheets. (Q5, G4, ST)

814-Q. Round Work Correction for Rockwell Hardness. Louis Small and Keith Symon. *Tool Engineer,* v. 29, Aug. 1952, p. 41-45.

Analyzes errors involved in the Rockwell testing of round work so that a correction chart can be developed for use with Rockwell hardness specifications. (Q29)

815-Q. Alternate Steels Offer Many Important Economic Advantages in Addition to Conserving Materials. George Huck. *Western Metals,* v. 10, July 1952, p. 51-54.

Graphs and tables give data on various alloy steels, especially their mechanical properties and hardenabilities. (Q general, J26, AY)

816-Q. (French.) Photoelastic Study of Fracture During Pure Bending. Félix Zandman. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, June 9, 1952, p.

2337-2339.

Photo-elastic study made on a sample of methyl methacrylate. The photographs show the origin of the fracture and its mode of propagation. (Q25, Q26)

817-Q. (French.) **Improvements in Chromium-Molybdenum Steel Resistant to Elevated Temperatures.** O. L. Bihet and A. Gourlez de la Motte. *L'Ossature Métallique,* v. 17, June 1952, p. 327-331.

Experiments on addition of V to increase the hardness of Cr-Mo steel containing 0.5-0.7% Cr and 0.4-0.5% Mo. Investigation with the electron microscope. Graphs and micrographs. (Q29, AY)

818-Q. (German.) **Recent Results on the Endurance of Riveted Joints in Aluminum Sheets.** Hermann Bürnheim. *Aluminium,* v. 28, May 1952, p. 140-143; July-Aug. 1952, p. 222-229.

Graphs and tables show little variation among various Al and Mg alloys in dynamic strength properties. Second part: Influence of design, layout, and riveting method on endurance of riveted joints. (Q7, Al, Mg)

819-Q. (German.) **Aluminum-Zinc-Magnesium Alloys.** P. Brenner. *Aluminium,* v. 28, July-Aug., 1952, p. 216-222.

Improvements in yield and tensile strengths; also in corrosion resistance. Effects of addition of Cu. Graphs and tables show comparative properties of the various compositions. Effects of plating with different metals, and phase diagrams for the systems Al-Zn-Mg, Al-Si-Mg, and Al-Cu-Mg, all in the Al-rich regions. 23 ref. (Q general, R general M24, Al)

820-Q. (German.) **Endurance Limit of Welded and Unwelded Steel Specimens With and Without Influence of Corrosion.** Clemens Appaly and Franz Bollenrath. *Brennstoff-Wärme-Kraft,* v. 4, July 1952, p. 223-227.

Reports on experiments on low-alloy Mn and Cr-Mn steels, with and without exposure to aqueous corrosion. Experimental details; results tabulated and charted. (Q7, R4, AY)

821-Q. (German.) **The Behavior of Metallic Materials at Low and High Temperatures.** W. Ruttmann and M. Werner. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, July 11, 1952, p. 673-682.

Proposes the plotting of time-resistance diagrams for materials showing mechanical properties which are dependent upon temperature and time. Data are tabulated and charted for a wide variety of ferrous and nonferrous metals. 33 ref. (Q general)

822-Q. (Spanish.) **Mechanical Tests With Micro-Test Specimens.** F. del Moral and M. Alvarez. *Ciencia y Técnica de la Soldadura,* v. 1, July-Aug. 1951, 8 pages.

Apparatus which makes it possible to carry out tensile, fatigue, and shear tests on very small test pieces. This machine produces a photographic diagram of strengths and deformations, from which can be deduced all of the characteristics of the material under study. (Q27, Q2, Q7)

823-Q. A New Micro-Bending Test Method. N. Mironoff. *Engineers' Digest,* v. 13, July 1952, p. 210-211. (Translated and condensed.)

Previously abstracted from *Revue de la Soudure.* See item 337-Q, 1952. (Q5, Q23)

824-Q. Chrome Carbide Has Unusual Physical Properties. *Iron Age,* v. 170, Aug. 14, 1952, p. 129.

Test results on hardness, density, transverse rupture strength, compressive strength, coefficient of thermal expansion, abrasive resistance, resistance to oxidation, resistance to corrosion, and magnetic permeability. (Q general, P16, R general, Cr, C-n)

825-Q. Clutches. A. F. Gagne Jr. *Machine Design,* v. 24, Aug. 1952, p. 123-158.

Details of design, selection, and application for optimum performance. Includes tables of characteristic features of commercially available clutches, of industrial clutch manufacturers, and of frictional properties of metallic and nonmetallic clutch materials. Numerous diagrams and illustrations. 31 ref. (Q9, T7)

826-Q. Proof Testing of Full Sized Automobile Components. A. L. Boegehold. *Metal Progress,* v. 62, Aug. 1952, p. 82-86.

Fatigue-testing equipment and procedures of Research Laboratories Div., General Motors Corp. (Q7)

827-Q. Embrittlement in Plated Steel. John J. Dale. *Metal Progress,* v. 62, Aug. 1952, p. 95-96.

Two examples of damage done to steel parts by hydrogen generated during electroplating operations. In each instance the defects show marked directionality. (Q23, L17, ST)

828-Q. High-Temperature Embrittlement of Straight Chromium Steels. *Metal Progress,* v. 62, Aug. 1952, p. 156, 158, 160. (Condensed from "High-Temperature Embrittlement in Chromium-Iron Alloys Containing 12-16%

Chromium", Helmut Thielsch, *Metallurgia.*)

Previously abstracted from original. See item 63-Q, 1952.
(Q23, N8, SS)

829-Q. Crushing Strength Requirements Metallurgy. *Precision Metal Molding,* v. 10, Aug. 1952, p. 29, 86.

Textile-machinery chain roll made of Fe 5% Cu powder. Advantages over machined gray cast iron.
(Q27, H general, Fe)

830-Q. Allowable Design Loads for Aluminum Columns. Martin A. Rubinstein. *Product Engineering,* v. 23, Aug. 1952, p. 197, 199, 201.

Nomograms, their mathematical development, and illustrative examples. (Q28, Al)

831-Q. Bhn/E $\times$ 10^6 = Modell = Measure of Wear Resistance. *SAE Journal,* v. 60, Aug. 1952, p. 42-45; disc., p. 45-46. (Excerpts from "Hardness, Elastic Modulus, and Wear of Metals", by T. L. Oberle.)

Ratio of Brinell hardness to elastic modulus, multiplied by 10^6 is designated "modell". Modell values for various materials are tabulated and discussed. (Q9)

832-Q. A Researcher's Casebook on Magnesium Truck Wheels. *SAE Journal,* v. 60, Aug. 1952, p. 61-66. (Excerpts from "Magnesium Alloy Truck Wheels Evaluated Analytically", by Marvin H. Polzin.)

Results of investigation of bending strength, endurance limit, fatigue strength, stress-strain properties, as compared with Al and steel. Effects of design factors.
(Q general, T21, Mg)

833-Q. Transition From Ductile to Brittle Behavior in Pressure Vessel Steels. T. N. Armstrong, N. A. Kahn, and Helmut Thielsch. *Welding Journal,* v. 31, Aug. 1952, p. 371s-380s.

Nature of brittle behavior, evaluation of brittle behavior of steels, effects of temperature, transition temperature, effects of notches and notch sensitivity, test methods, code-test requirements, significance of test data, ductility and fracture transition, factors determining transition temperatures, metallurgical factors, mechanical factors, and fields for further study.
(Q23, CN, AY)

834-Q. (Book) **Mechanical Properties of Metals at Low Temperatures.** 206 pages. 1952. National Bureau of Standards, Circular 520. (Available from Superintendent of Documents, Washington 25, D. C.) $1.25.

Proceedings of the NBS Semicentennial Symposium, Washington, D. C., May, 1951. (Q general)

835-Q. (Book) **Report on the Elevated-Temperature Properties of Stainless Steels.** Ward F. Simmons and Howard C. Cross. 115 pages. 1952. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. (Special Technical Publication 124.) $4.00.

Essentially a graphical summary of elevated-temperature data for the commercially produced stainless steels. Includes summary curves for tensile strength, 0.2% offset yield strength, % elongation, % reduction of area, stresses for rupture in 100, 1000, 10,000, and 100,000 hr., and stress for creep rates of 0.0001 and 0.00001% per hr. (1% in 10,000 and 100,000 hr). Appendix contains the primary data from which the summary curves were drawn.
(Q general, SS)

836-Q. (Book) **Residual Stress Measurements.** 210 pages. 1952. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $4.50.

Four educational lectures presented during the 33rd National Metal Congress and Exposition, Detroit, Oct. 15-19, 1951. Individual lectures are abstracted separately. (Q25)

837-Q. The Growth and Present State of Three-Dimensional Photoelasticity. M. M. Frocht. *Applied Mechanics Reviews,* v. 5, Aug. 1952, p. 337-340.

A review from the work of Oppel to the present time. Optical method of stress analysis may be viewed as a practical instrument capable of the exploration of the complete state of stress in general space problems. 43 ref. (Q25)

838-Q. The Performance of Hard Facing Welding Alloys. N. D. Berrick. *Australasian Engineer,* June 7, 1952, p. 54-59.

Wear and other factors involved, laboratory and service testing, and manufacture of hard facing rods and electrodes. Service results for a series of commercial examples.
(Q9, T5, ST, SG-m)

839-Q. Stress-Probing: a Rapid Method for Stress-Surveying. Nicol Gross and P. H. R. Lane. *Engineering,* v. 174, July 25, 1952, p. 97-100.

New method for measurement of stresses in pressure vessels which is much cheaper and less time consuming than the strain-gage method, yet gives results in good agreement with the latter. A commercially produced measuring gage, based on change of helix angle of a perforated twisted strip, is used. Comparative results are charted. (Q25)

840-Q. Instrumentation for a Precision Creep-Testing Laboratory. Joe Lundholm, Jr. *Instruments,* v. 25, Aug.

1952, p. 1096-1101; *I.S.A. Journal*, v. 8, Aug. 1952, p. 94-99.

Described, diagrammed, and illustrated. (Q3)

841-Q. A Yield Criterion for Ductile Metals Based Upon Atomic Structure. Milton C. Shaw. *Journal of The Franklin Institute*, v. 254, Aug. 1952, p. 109-126.

A strength theory for ductile metals is presented that takes into account short range inhomogeneities present in all commercial metals. Examples illustrate the shortcomings of conventional maximum shear-stress and distortion energy theories that result from failure of these theories to recognize the inhomogeneous nature of metals. Shows why a size effect is observed with torsion specimens but not with tensile specimens of usual size. The size effect in fatigue testing and hardness testing by means of micro techniques. Relation of the new theory for ductile metals to the statistical theory of Weibull for brittle materials. 21 ref. (Q23)

842-Q. Materials for Springs for Use at Elevated Temperatures. *Mainspring*, v. 14, Aug. 1952, 4 pages.

Results of experimental study of various spring materials at temperatures from 250 to 700° F. Initial stress is plotted against per cent loss of load at various temperatures for oil tempered valve-spring wire, for SAE 6150 and 9254 steels, for Type 302 18-8 stainless, and for 18-4-1 high-speed steel.
(Q23, AY, SS, TS, SG-b)

843-Q. Wear and Sliding Friction Properties of Nickel Alloys Suited for Cages of High-Temperature Rolling-Contact Bearings. I. Alloys Retaining Mechanical Properties to 600° F. II. Alloys Retaining Mechanical Properties Above 600° F. Robert L. Johnson, Max A. Swikert, and Edmond E. Bisson. *National Advisory Committee for Aeronautics*, Technical Notes 2758 and 2759, Aug. 1952, 30 and 29 pages.

Part I: Wear and sliding-friction properties of "L" nickel, wrought monel, cast monel, cast modified "H" monel, cast "S" monel, Invar, Ni-Resist 3, and Nichrome V in contact with hardened SAE 52100 steel. Part II: Properties of cast Be-Ni, heat treated Be-Ni, cast Inconel, Nimonic 80, Inconel X, Refractalloy 26, and Discaloy were studied in similar circumstances. Development of a naturally formed nickel oxide film produced good properties. Relative merits of the different materials. 22 ref.
(Q9, Ni, CI, Fe, AY, SG-h)

844-Q. Surface Oxide Films in Intermetallic Contacts. M. Cocks. *Nature*, v. 170, Aug. 2, 1952, p. 203-204.

Bowden and Hughes have shown that removal of surface oxide films can endow metals with very high coefficients of friction. To examine to what extent these films, when present, prevent metallic contact, electrical resistance measurements were made on the loaded junction between crossed cylinders of various metals. Results are charted and discussed. (Q9, P15)

845-Q. Mechanical Properties of Thin Films of Silver. J. W. Beams, W. E. Walker, and H. S. Morton, Jr. *Physical Review*, ser. 2, v. 87, Aug. 1, 1952, p. 524-525.

Films of silver of uniform thickness were electrodeposited on small cylindrical steel rotors with rounded ends and the rotational speeds required to throw them off the rotors were measured. The rotors were spun in high vacuum. Tensile strength determined in this way is charted as a function of thickness. (Q general, Ag)

846-Q. Metal Transfer During Static Loading and Impacting. E. Rabinowicz. *Proceedings of the Physical Society*, v. 65, sec. B, Aug. 1, 1952, p. 630-640.

Experiments on pressing of a hemispherical slider into a flat metal surface show that metal fragments are transferred from one surface to another, and this shows that strong junctions are formed between metal surfaces in contact. Experiments were made using various similar and dissimilar metal pairs. Lubricants were found to reduce size, not number of junctions. Diagrams, autoradiographs, micrographs. 10 ref. (Q9)

847-Q. The Creep of Metals Under Interrupted Stressing. A. J. Kennedy. *Proceedings of the Royal Society*, ser. A, v. 213, July 22, 1952, p. 492-506.

The creep behavior of polycrystalline Pb subjected to interrupted stress, or stress pulses, was examined with an apparatus which enables the creep curve to be recorded as a magnified photographic trace. When the metal is reloaded after an interruption, a new creep transient is exhibited which can be adequately expressed by assuming a fraction n of the material to have recovered its original Andrade β-flow properties, while the remaining fraction continues to deform as if unloading had not occurred. It is shown that this analysis is valid whether the material exhibits a finite Andrade k-flow or not. Variation

of n with the time of creep previous to interruption, for a constant recovery time (R), and variation of n with R for a constant time were each investigated. 18 ref. (Q3, Pb)

848-Q. On Wear Properties of Spheroidal Graphite Cast Iron. Fusao Hayama. *Reports of the Casting Research Laboratory,* No. 3, 1952, p. 20-22.

Wear-test apparatus is diagrammed. Results are tabulated, charted and discussed for six microstructural types of cast iron. (Q9, CI)

849-Q. Studies on the Ternary System of the Al-Si-Zn Casting Alloy. Shigeo Oya. *Reports of the Casting Research Laboratory,* No. 3, 1952, p. 46-47.

Ternary diagrams show tensile strenth and Brinell hardness of Al-Si-Zn casting alloys, also effects of 0.5% Cr on these properties. (Q23, Q29, M24, Al)

850-Q. Impact Compression of Short and Long Column. Yuji Matsuura. *Reports of the Casting Research Laboratory,* No. 3, 1952, p. 62.

Results of experiments on square brass columns, compressed by a drop hammer. Graphs. (Q28, Cu)

851-Q. The Research for the Fatigue of Mild Steel by Etching. Hiroshi Yamanouchi and Takeshi Inukai. *Reports of the Casting Research Laboratory,* No. 3, 1952, p. 63-64.

Study of the mechanism of fatigue-crack initiation. The specimens were etched to reveal the microstructure in the neighborhood of crack inception. (Q7, CN)

852-Q. Theory of Mechanical Wear. J. F. Archard. *Research,* v. 5, Aug. 1952, p. 395-396.

Briefly discussed. (Q9)

853-Q. B. W. R. A. Fatigue Testing Laboratory. *Welding and Metal Fabrication,* v. 20, Aug. 1952, p. 289-292.

New laboratory of British Welding Research Assn. (Q7)

854-Q. (French.) **Notched-Bar Impact Test and Various Embrittling Factors.** Gilbert Remy. *Métaux: Corrosion—Industries,* v. 27, June 1952, p. 245-264.

Extensive analysis of experimental and theoretical work. Possibility of generalization of the laws of plastic deformation. Numerous graphs taken from the literature. 46 ref. (Q6)

855-Q. (French.) **Physical Principles of Creep.** P. Laurent. *Métaux: Corrosion—Industries,* v. 27, June 1952, p. 265-273.

Critically discusses literature on deformation by creep, behavior of metal during creep, and rupture by creep and their principles. Data from the literature are charted and tabulated. (Q3)

856-Q. (German.) **Hot Brittleness of Nickel-Chromium Steels.** Gustav Hoch. *Archiv für das Eisenhüttenwesen,* v. 23, July-Aug. 1952, p. 257-275; disc., p. 275-276.

Reviews various brittleness phenomena, with quantitative data on types of brittleness. In particular, brittleness occurring after prolonged annealing; experimental results of notch-impact and hot-tensile tests on Cr-Ni stainless steels. Data are tabulated and charted; micrographs. 14 ref. (Q23, SS)

857-Q. (German.) **Determination of Residual Stresses in Finished Pieces.** Hans Bühler. *Archiv für das Eisenhüttenwesen,* v. 23, July-Aug. 1952, p. 293-297.

Stress measurements done on steel cylinders by means of G. Sachs' drilling process. The effect of area of the end surface, and of length, upon results. Application of the method to hollow cylinders is proposed. Data are tabulated and charted. (Q25, ST)

858-Q. (German.) **Alternating Tension and Compression-Stress Fatigue Strength and Changes in the Properties of Steels After Various Rates of Cold Forming.** Hans-Rolf Sander and Max Hempel. *Archiv für das Eisenhüttenwesen,* v. 23, July-Aug. 1952, p. 299-320.

Details of experiments to complement data in the literature. Results of various tests. Tables, charts, micrographs and 54 ref. (Q7, ST)

859-Q. (German.) **The Creep Behavior of Some Nonferrous Metals and Their Alloys.** K. Löhberg. *Metall,* v. 6, Aug. 1952, p. 446-450.

Dependence of creep behavior of metals on fusion temperature and lattice structure. Results of experiments on Pb, Cu, Al, Mg, Zn, and their alloys are charted. (Q3, Pb, Cu, Al, Mg, Zn)

860-Q. (German.) **The Applicability of Technical Methods of Measuring Internal Stresses in Metallic Workpieces.** Hans Bühler. *Stahl und Eisen,* v. 72, July 31, 1952, p. 947-952.

Different measuring methods developed using specimens of ring, disk or strip shape and their applicability. Advantages and disadvantages of stress measurements on cores bored out of solid and hollow workpieces. Application of extension measurement strips for measuring total internal stresses in solid and hollow cylinders. 29 ref. (Q25)

861-Q. (German.) **Brittle Fracture of Crystallized Substances as a Surface Phenomenon.** M. Schreckenbach. *Technik,* v. 7, Feb. 1952, p. 65-73.

Inadequacy of orthodox explanation of brittle fracture. Such fracture occurs when the energy required to form a fracture surface is available in a plastically transmittable manner, and fracture occurs as soon as this energy has become great enough. 60 ref. (Q26)

862-Q. (German.) **Research on the Bursting Strength of Safety Discs.** Hans Biegler. *Technik,* v. 7, Feb. 1952, p. 74-76.

Research results on pressure and temperature safety disks. Stressed and ruptured disks of various materials, including gray cast iron, are illustrated. (Q26, CI)

863-Q. (German.) **Fatigue Fractures Within the "Shrink-Fit" Connections of Crankshafts.** K. Gleitz. *Technik,* v. 7, Mar. 1952, p. 107-112.

Correct designs of crankshafts to prevent fractures and the possibility of repairing cracked shafts by thermit welding. Diagrams, photographs, tables, and photomicrographs. (Q7, K4, ST)

864-Q. (German.) **Computation and Experimental Testing of the Strength Properties of Automotive Parts.** Heinz Glaubitz. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, July 21, 1952, p. 715-719.

Strength properties of individual stressed automobile parts and testing methods. Charts and graphs. 25 ref. (Q23)

865-Q. (Russian.) **Stress and Deformation During Cyclic Loading.** Iu. N. Rabotnov. *Prikladnaia Matematika i Mekhanika,* v. 16, Jan.-Feb. 1952, p. 121-122.

A brief mathematical analysis. (Q27)

866-Q. Creep-Rupture and Recrystallization of Monel From 700-1700° F. Nicholas J. Grant and Albert G. Bucklin. *American Society for Metals,* Preprint 5, 1952, 20 pages.

Extensive creep-rupture tests were made on wrought Monel at temperatures from 700-1700° F. and for rupture times from about 0.001 to 2700 hr. Tests were made on annealed, 30% cold worked, and 75% cold worked structures. Recrystallization data were obtained for Monel cold worked from 4 to 70% and annealed from 0.5 to 500 hr. at temperatures from 800 to 1700° F. Correlation of recrystallization data from static tests with hardness changes and equicohesion values from stress-rupture tests was attempted. Experimentally determined values of equicohesion are given for 30% cold worked Monel. (Q4, N5, Ni)

867-Q. Influence of Grain Size on High Temperature Properties of Monel. Paul Shahinian and Joseph R. Lane. *American Society for Metals,* Preprint 6, 1952, 22 pages.

Specimens of two heats were tested in creep-rupture at 700, 900, 1100, and 1300° F. and at stresses ranging from 7000 to 65,000 psi. Grain sizes, which ranged from 0.024 to 0.78 mm. average diameter were obtained by cold work and recrystallization. Time-to-rupture, minimum creep rate, total elongation, and reduction-in-area curves were drawn showing their relationship to grain size. 16 ref. (Q3, Q4, Ni)

868-Q. Creep and Rupture of Chromium-Nickel Austenitic Stainless Steels. E. J. Dulis, G. V. Smith, and E. G. Houston. *American Society for Metals,* Preprint 7, 1952, 35 pages.

Creep and rupture test data for AISI Grades 304L, 304L (high N) 316L, 316-Cb, and 303; test results of additional heats of 304, 321, and 347. Changes in microstructure and in certain room-temperature mechanical properties brought about by creep-test exposure. (Q3, Q4, M27, SS)

869-Q. Temperature Dependence of the Hardness of Pure Metals. J. H. Westbrook. *American Society for Metals,* Preprint 17, 1952, 23 pages.

The literature covering the hardness of pure metals as a function of temperature is reviewed and some generalizations made. These led to an approximate method for calculating hardness of a pure metal as a function of test temperature, crystal structure, specific heat, and heats of fusion and transformation. The method has approximate validity from near absolute zero to about half the absolute melting point. 50 ref. (Q29)

870-Q. Hardness of Various Steels at Elevated Temperatures. F. Garofalo, P. R. Malenock, and G. V. Smith. *American Society for Metals,* Preprint 18, 1952, 18 pages.

A hot hardness tester of the static-loading type and testing techniques. A number of different steels, including various types of 18 Cr, 8 Ni stainless, plain carbon steels and an 8 Cr + 1 Mo steel, were tested at temperatures ranging from room temperature to 1500° F. The results indicate a general relation between hot hardness and creep or creep-rupture strength, which, to a first approximation, is independent of

structure or test temperature. A similar relation was observed between hot hardness and ultimate tensile strength in short-time hot tensile tests. 16 ref. (Q29, SS, AY)

871-Q. Some Properties of a Nodular Iron at Elevated Temperatures. M. S. Saunders and M. J. Sinnott. *American Society for Metals,* Preprint 19, 1952, 12 pages.

Short-time tensile data over the range 800-1200° F. for a typical nodular iron in two conditions: as-cast and partially annealed. Elevated-temperature impact data for various exposure times over the same range. Stress-rupture data at 1200° F. for the iron in both conditions. Comparison with the same properties of killed carbon steel and with C-Mo steel. (Q27, Q6, Q4, CI)

872-Q. Accelerated Strain Aging of Commercial Sheet Steels. L. R. Shoenberger and E. J. Paliwoda. *American Society for Metals,* Preprint 20, 1952, 15 pages.

Effect of natural strain aging on hardness and tensile characteristics of some rimmed and stabilized steels. Variations in behavior of rimmed steels are ascribed principally to ferrite grain size and degree of skin rolling. In strain aging of Al-killed and vanadium rimmed steels, the N not combined with Al or V assumes an important position as shown by its relationship to proportional-limit changes. An accelerated strain-aging test using gradient heating was developed to predict the course of age hardening and to estimate rate and severity of yield-point return during aging. 11 ref. (Q27, N7, CN)

873-Q. X-Ray Measurement of Residual Stress in Hardened High-Carbon Steel. A. L. Christenson and E. S. Rowland. *American Society for Metals,* Preprint 22, 1952, 29 pages.

X-ray method for measurement of macro or engineering stress in hardened high-carbon steel. The method is applied to measurement of O.D. surface stress in carburized and hardened rings of SAE-4620 steel with heat treated, ground, and electrolytically polished surfaces. (Q25, AY)

874-Q. The Endurance Limit of Temper-Brittle Steel. R. D. Chapman and W. E. Jominy. *American Society for Metals,* Preprint 23, 1952, 12 pages.

Investigation of effect of temper brittleness of an SAE 5140 steel on endurance limit at both room temperature and at 35° F. Three different heat treatments were applied. Both polished and notched bars were tested in fatigue at room and subzero temperatures. In addition, tensile and standard V-notch Charpy impact specimens were tested at the same temperatures. 15 ref. (Q7, AY)

875-Q. Plastic Stress-Strain Relations of Alcoa 14S-T6 for Variable Biaxial Stress Ratios. Joseph Marin, L. W. Hu, and J. F. Hamburg. *American Society for Metals,* Preprint 24, 1952, 22 pages.

Three types of biaxial stress tests were conducted: constant-stress-ratio tests and two types of variable-stress-ratio tests. Main object of the study, however, was not to report on the constant-stress-ratio tests, but to determine validity of the flow-type theory in predicting plastic stress-strain relations under combined stresses. Data are charted and tabulated. (Q27, Al)

876-Q. The Effect of Various Heat Treating Cycles Upon Temper Brittleness. L. D. Jaffe, D. C. Buffum, and F. L. Carr. *American Society for Metals,* Preprint 25, 1952, 7 pages.

Material from one heat of SAE 3140 steel was quenched and tempered. Portions were subjected to 20 different temper-embrittlement cycles involving slow and rapid heating and cooling, with and without isothermal holding at one temperature. Temperature of transition from tough to brittle fracture in the V-notch Charpy test was determined after each treatment. (Q23, J26, AY)

877-Q. Effect of Hardness on the Level of the Impact Energy Curve for Temper Brittle and Unembrittled Steel. Frank L. Carr, Manuel Goldman, Leonard D. Jaffe, and Donald C. Buffum. *American Society for Metals,* Preprint 26, 1952, 5 pages.

Specimens of martensitic SAE 3140 steel were tempered for short times at several temperatures between 500 and 675° C. to give various hardnesses ranging from Rockwell C-20½ to C-38. Comparisons of energy levels in the V-notched Charpy test were made at 200° C. above the temperature of transition from ductile to brittle failure. A linear relationship between impact-energy level and hardness was found in the hardness range Rockwell C-27 to at least C-38. (Q6, Q29, AY)

878-Q. Transverse Mechanical Properties in an SAE 1045 Forging Steel. Arthur H. Grobe, Cyril Wells, and Robert F. Mehl. *American Society for Metals,* Preprint 27, 1952, 34 pages.

Tensile-test data for specimens from a high-quality SAE forging

steel were accumulated and analyzed statistically. Specimens were cut from the original ingot and from forgings reduced 2 to 1, 4 to 1, and 10 to 1. Approximately 60 transverse or 10 longitudinal values per each property investigated constituted a sample. The investigation included a study of tensile properties associated with two pearlite and ferrite structures—annealed and air-cooled—and four quenched and tempered structures—quenched to martensite and tempered at 750, 950, 1100, and 1250° F. Effect of angle of test from transverse to longitudinal direction on tensile properties was determined for 10-1 reduction for specimens in the annealed and quenched and tempered state. Tensile-test data are presented for commercial forgings. (Q27, CN)

879-Q. The Determination of the Elastic Constants of Metals by the Ultrasonic Pulse Technique. Myron B. Reynolds. *American Society for Metals,* Preprint 28, 1952, 15 pages.

Technique was used to determine Young's modulus, shear modulus, and Poisson ratio of Be, Cb, Zr, Ti, V, Th, U, α-brass, and Type 347 stainless steel. Relationships between elastic wave velocities and elastic constants are given for the case of an isotropic solid. Elastic wave propagation and reflection are treated briefly. Technique and apparatus and computation of wave velocities. Elastic moduli obtained are tabulated and discussed. (Q21, Be, Cb, Zr, Ti, V, Cu, SS)

880-Q. Mechanical Properties and Strain Aging Effects in Titanium. R. D. Rosi and F. C. Perkins. *American Society for Metals,* Preprint 29, 1952, 20 pages.

Tensile properties of Ti of commercial purity were investigated between 77 and 925° K. at constant strain rates of 0.003 and 0.138 min. Results of these tests showed that this material exhibits the usual mechanical effects associated with strain aging. Some observations were made on the nature of Lüders' bands in an extended, coarse-grained sheet specimen. 16 ref. (Q27, Ti)

881-Q. Mechanical Properties, Including Fatigue, of Titanium-Base Alloys RC-130-B and Ti-150-A at Very Low Temperatures. S. M. Bishop, J. W. Spretnak, and M. G. Fontana. *American Society for Metals,* Preprint 31, 1952, 14 pages.

The alloys were subjected to tensile, fatigue, impact, hardness, and dilatometric tests at low temperatures. Data are reported for tensile and fatigue at 77, -108, and -321° F.; impact and hardness at 77, -108, -197, -321 and -423° F.; and expansion from room temperature to -321° F. Apparatus and techniques. (Q general, Ti)

882-Q. A Study of the Mechanism of the Delayed Yield Phenomenon. T. Vreeland, Jr., D. S. Wood, and D. S. Clark. *American Society for Metals,* Preprint 33, 1952, 13 pages.

Experimental investigation of behavior of an annealed low-carbon steel subjected to a rapidly applied constant stress and to repeated short-duration stress-pulses. Effect of time of aging on number of stress-pulses to induce yielding was determined. Effects observed are discussed in terms of the dislocation theory of yielding. 16 ref. (Q23, CN)

883-Q. Properties of Some Hydrogen-Sintered, Binary Molybdenum Alloys. W. L. Bruckhart, M. H. LaChance, C. M. Craighead, and R. I. Jaffee. *American Society for Metals,* Preprint 36, 1952, 25 pages.

From a study conducted on alloys representing 18 different binary types, data are presented showing effects of these additions on fabricability, room-temperature mechanical properties, and hot hardness to 800° C. Results indicate that Al, Co, Cr, Fe, Si, and W are the most effective alloying additions. (Q general, Mo)

884-Q. The Effect of Dispersions on the Tensile Properties of Aluminum-Copper Alloys. R. B. Shaw, L. A. Shepard, C. D. Starr, and J. E. Dorn. *American Society for Metals,* Preprint 37, 1952, 23 pages.

The plastic properties were correlated with mean free path between the hard $CuAl_2$ particles dispersed in the α solid solution phase. True stress-true plastic strain curves for the various dispersions formed a homologous series, yield strength and the rate of strain hardening increasing uniformly with decreasing mean free path. These results were found to be valid from 78 to 295° K. and for compositions of 3, 4, and 5% Cu in high-purity Al. (Q27, Al)

885-Q. Some Properties of High Purity Zirconium and Dilute Alloys With Oxygen. R. M. Treco. *American Society for Metals,* Preprint 38, 1952, 19 pages.

A systematic investigation of the physical and mechanical properties of dilute alloys of oxygen in high-purity iodide-refined Zr. A marked strengthening effect was observed as a result of O_2 additions. Results

of tensile tests at elevated temperatures up to 400° C. Preparation of alloys. 14 ref.
(Q general, P general, Zr)

886-Q. Intercrystalline Cracking of Metals. J. Neill Greenwood. *Bulletin of the Institute of Metals,* v. 1, Aug. 1952, p. 104-105. (Bound with *Journal of the Institute of Metals,* v. 80, Aug. 1952.); *Journal of the Iron and Steel Institute,* v. 171, Aug. 1952, p. 380.

A model is used as an aid in explaining mechanism of intercrystalline cracking. Conditions necessary appear to be increased temperature and decreased rate of strain. (Q23)

887-Q. Cross-Slip in Aluminium and α-Brass. Robert Maddin. *Bulletin of the Institute of Metals,* v. 1, Aug. 1952, p. 105-106. (Bound with *Journal of the Institute of Metals,* v. 80, Aug. 1952.)

Summarizes previous findings. Micrographs. (Q24, Al, Cu)

888-Q. Low-Stress Torsional Creep Properties of Pure Aluminium. *Bulletin of the Institute of Metals,* v. 1, Aug. 1952, p. 106-108. (Bound with *Journal of the Institute of Metals,* v. 80, Aug. 1952.)

Two Letters to the Editor (by T. Ll. Richards and D. E. Yeomans, and by A. J. Kennedy) critically discuss some recent results reported in the literature. Kennedy points out that the results reported are not irreconcilable with the behavior of fairly simple models. Graphs. 10 ref. (Q3, Al)

889-Q. The Effect of Water Corrosion and Shot Peening on Fatigue Strength of Mining Drill Rods. T. W. Wlodek. *Canadian Mining and Metallurgical Bulletin,* v. 45, Aug. 1952, p. 470-477; disc., p. 477-478; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 55, 1952, p. 292-299; disc., p. 299-300.

Results of research into the fatigue properties of SAE 1080 carbon steel and low-alloy Ni-Cr-Mo steel for mining drill rods. Eight S-N curves for as-rolled and shot-peened mining drill rods under both dry and water corrosion conditions were derived—their shape and relative position. Features relating to field performance of the drill rods.
(Q7, G23, R4, CN, AY)

890-Q. Physical and Mechanical Properties and Specifications for Magnesium Alloys. J. C. McDonald. *Engineer Research and Development Laboratories* (Ft. Belvoir, Va.), "The Magnesium Symposium", Feb. 9, 1951, p. 7-19.
(Q general, S22, Mg)

891-Q. Design for Magnesium Castings and Forgings. George L. Moore. *Engineer Research and Development Laboratories* (Ft. Belvoir, Va.), "The Magnesium Symposium", Feb. 9, 1951, p. 21-35.

Choice of manufacturing process, alloy, and heat treatment; dimensional details of the design; fatigue, creep, and impact properties.
(Q general, E general, F22, Mg)

892-Q. Metals Can Be Softened By Cold Work. N. H. Polakowski. *Iron Age,* v. 170, Aug. 28, 1952, p. 106-111.

See abstract of "Softening of Metals During Cold Working", *Journal of the Iron and Steel Institute,* item 154-Q, 1952.
(Q24, N5, Cu, Ni, Al, ST)

893-Q. Austenitic Cast Stainless Good for Low Temperature Applications—But. J. W. Juppenlatz. *Iron Age,* v. 170, Sept. 4, 1952, p. 147-151.

Shows that a full austenitic structure or low magnetic permeability is not a guarantee of high impact strength at low temperatures. Although welding of some grades does not seriously affect low-temperature properties, post-weld solution treatment is shown to be advisable for improved corrosion resistance. Comparative mechanical properties are charted. (Q6, R general, SS)

894-Q. How Good is the Charpy Impact Test? C. A. Penrose. *Iron Age,* v. 170, Sept. 11, 1952, p. 143-147.

To determine reliability of the Charpy test and its reproducibility, steels of 150,000-160,000 psi. yield strength, having impact strength of 20-30 ft.-lb. were tested at −40° F. Within these limits and only for this set of conditions the Charpy "V" notch test is reliable. Photomicrographs, diagrams, and tables.
(Q6, ST)

895-Q. Anelasticity of Zinc. Shuichiro Takhashi. *Journal of Applied Physics,* v. 23, Aug. 1952, p. 866-868.

Investigation using bars vibrating transversely at audio frequencies in the "free-free" modes. With these specimens, a discontinuous phenomenon which is supposed to be closely correlated with slips occurring in the crystal was found.
(Q22, Zn)

896-Q. Twin Accommodation in Zinc. P. L. Pratt and S. F. Pugh. *Journal of the Institute of Metals,* v. 80, Aug. 1952, p. 653-658.

A study of plastic deformation of single crystals of Zn, using opaque-stop and X-ray microscopic techniques to examine cleavage faces. Stresses arising from twinning shear are shown to be relieved by accommodation kinking. Diagrams. 10 ref.
(Q24, Zn)

897-Q. The Creep and Softening Properties of Copper for Alternator Rotor Windings. *Journal of the Institute of Metals,* v. 80, Aug. 1952, p. 682-683.

Discussion of paper by N. D. Benson, J. McKeown, and D. N. Mends. See item 10-Q, 1952. (Q3, Cu)

898-Q. Factors Influencing the Creep Resistance of Wrought Carbon Steels. C. H. M. Jenkins and H. J. Tapsell. *Journal of the Iron and Steel Institute,* v. 171, Aug. 1952, p. 359-371.

Summarizes work on creep properties of carbon steels carried out for the Electrical Research Assn. at the National Physical Laboratory between 1929 and 1948. Influence of a number of manufacturing variables and other metallurgical factors on the creep rate, with particular reference to steels having abnormally high creep rates. Tables, graphs, photomicrographs. 22 ref. (Q3, CN)

899-Q. Influence of Chemical Composition on the Rupture Properties at 1200° F. of Wrought Cr-Ni-Co-Fe-Mo-W-Cb Alloys. E. E. Reynolds, J. W. Freeman, and A. E. White. *Journal of Metals,* v. 4, Sept. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 946-958.

Investigation results for 63 modifications of Cr-Ni-Co-Fe-base alloys at 1200° F. Melting, fabrication, and heat treatment were kept constant. Micrographs, tables, and graphs. 17 ref. (Q26, Cr, Ni, Co, Fe)

900-Q. Creep Correlations in Alpha Solid Solutions of Aluminum. Oleg D. Sherby and John E. Dorn. *Journal of Metals,* v. 4, Sept. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952; p. 959-964.

Materials, equipment, technique, results, and validity of results of study to determine secondary creep rates and temperatures for correlations between creep and tensile data on basis of the Zener-Hollomon relationship. Diagrams and tables. 11 ref. (Q3, Al)

901-Q. Some Observations of Subgrain Formation During Creep in High Purity Aluminum. Italo S. Servi, John T. Norton, and Nicholas J. Grant. *Journal of Metals,* v. 4, Sept. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 965-971.

Coarse-grained high-purity aluminum was tested in creep at temperatures of 400-1200° F. to develop subgrain structures. Measurements of subgrain size, distribution and rotation were made from X-ray diffraction patterns. Micrographs and tables. 20 ref. (Q3, Al)

902-Q. Fatigue Tests at High Temperatures. *Metal Progress,* v. 62, Sept. 1952, p. 152, 154. (Condensed from "Hot Fatigue Testing", H. E. Gresham and B. Hall, *Iron and Steel Institute).* "Symposium on High-Temperature Steels and Alloys for Gas Turbines."

Previously abstracted from original. See item 510-Q, 1951. (Q7)

903-Q. Recent European Work on the Mechanical Properties of Metals at Low Temperatures. N. P. Allen. *National Bureau of Standards,* "Mechanical Properties of Metals at Low Temperatures", Circular 520, 1952, p. 1-34; disc., p. 34-35.

Elasticity and plasticity, and development of brittleness at low temperatures, in relation to brittle fracture in mild steel, behavior of heat treated alloy steels at temperatures prevailing in the stratosphere, and reliability of austenitic steels at liquid-air temperature. Properties at low temperatures of pure alloys of iron made at the National Physical Laboratory. Some alloying additions exert influence on resistance to plastic deformation. 29 ref. (Q general)

904-Q. Development and Application of Chromium-Copper-Nickel Steel for Low-Temperature Service. Walter Crafts and C. M. Offenhauer. *National Bureau of Standards,* "Mechanical Properties of Metals at Low Temperatures", Circular 520, 1952, p. 48-63; disc., p. 63-66.

An economical low-alloy Cr-Cu-Ni steel designed for service at low temperatures has been used successfully for many years in chemical plant fabrication and has consistently been suitable for use at −80° C. Several heats have been applied at −100° C. Experimental studies under laboratory conditions and observations of commercial heats suggest that a most significant and immediately applicable improvement would result from increase in the Al content above the amount required for grain refinement to a level of 0.10-0.20%. Mechanical properties are tabulated and charted. (Q general, T29, AY)

905-Q. Tensile Properties of Copper, Nickel, and Some Copper-Nickel Alloys at Low Temperatures. Glenn W. Geil and Nesbit L. Carwile. *National Bureau of Standards* "Mechanical Properties of Metals at Low Temperatures", Circular 520, 1952, p. 67-93; disc., p. 93-96.

Tension tests were made at −196, −140, −78, −30, +25 and +100° C. on high-conductivity Cu, cupronickel,

70% Ni +30% Cu alloy, and Ni in the annealed condition. True stress-strain curves were determined from numerous simultaneous load and diameter measurements made during the course of each test to fracture. Graphs show influence of test temperature and chemical composition on mechanical properties and work hardening characteristics. Effect of solute content of the alloys on initial strength, ultimate tensile stress, and on true stress and true strain at maximum load and at fracture. 14 ref. (Q27, Cu, Ni)

906-Q. Application of Metals in Aircraft at Low Temperatures. J. B. Johnson and D. A. Shinn. *National Bureau of Standards,* "Mechanical Properties of Metals at Low Temperatures", Circular 520, 1952, p. 97-109; disc., p. 109-111.

Relationship of properties of metals as determined by conventional laboratory tests and those selected by designer. Tests of aircraft metals at temperatures down to −420° F. Recommends that evaluation of serviceability of material at low temperatures not be based on transition from tough to brittle fracture as represented by results of notched-bar impact tests, as this may mean selection of steel with a higher content of strategic alloying elements than is necessary for the specific application. 14 ref. (Q23, T24)

907-Q. Properties of Austenitic Stainless Steels at Low Temperatures. V. N. Krivobok. *National Bureau of Standards,* "Mechanical Properties of Metals at Low Temperatures", Circular 520, 1952, p. 112-134; disc., p. 135-136.

Study and summary of published and unpublished information on strength characteristics of austenitic stainless steels at various subzero temperatures. Effect of composition on mechanical properties at room and subzero temperatures, calculations of true strength from test results, and influence of heat treatments, especially those that might result either in carbide precipitation or sigma formation, on mechanical properties at low temperatures. The beneficial influence of extra low carbon content. Data on modulus of elasticity, fatigue, impact, tensile impact, effect of notches, distribution of ductility at the notch, and the beneficial effects of low temperature on ductility characteristics. 18 ref. (Q general, SS)

908-Q. Dimensional Effects in Fracture. C. W. MacGregor and N. Grossman. *National Bureau of Standards,* "Mechanical Properties of Metals at Low Temperatures", Circular 520, 1952, p. 137-150; disc., p. 150-152.

Previously abstracted from *Welding Journal;* item 166-Q, 1952. (Q26, TS)

909-Q. Mechanical Properties of High-Purity Iron-Carbon Alloys at Low Temperatures. R. L. Smith, G. A. Moore, and R. M. Brick. *National Bureau of Standards,* "Mechanical Properties of Metals at Low Temperatures", Circular 520, 1952, p. 153-179; disc., p. 179.

Natural stress-strain data were obtained at temperatures from 23 to −185° C. on four high-purity Fe-C alloys containing 0.05-0.49% C. Conclusions resulting from analysis of the data. (Q27, Fe)

910-Q. Brittle Fractures in Ship Plates. Morgan L. Williams. *National Bureau of Standards,* "Mechanical Properties of Metals at Low Temperatures",Circular 520, 1952, p. 180-204; disc., p. 204-206.

Principal factors contributing to structural failures of welded ships and preventive measures that have been applied. Statistical interpretation of data obtained from laboratory investigations of 113 plates removed from fractured ships indicates that probability of fracture starting in plate increases markedly with increasing notch sensitivity as measured by the 15 ft. lb. transition temperature of Charpy V-notch specimens. 12 ref. (Q26, CN)

911-Q. A Torsion Pendulum of Improved Design for Measuring Damping Capacity. James W. Jensen. *Review of Scientific Instruments,* v. 23, Aug. 1952, p. 397-401.

Construction of equipment with an improved method of alignment which minimizes friction losses. (Q8)

912-Q. Sub-Zero Strain Aging Affects Iron Properties. *Steel,* v. 131, Sept. 1, 1952, p. 86-87.

Relative proportions of strain aging and hardening at the various temperatures for five conditions of ingot iron were determined on basis of known tendencies of two types of work hardening to increase or decrease these properties with temperature. (Q27, Fe)

913-Q. Ship Structural Members. Part V. A. G. Hadjispyrou and H. Lackenby. *Transactions of the Institution of Engineers & Shipbuilders in Scotland,* v. 95, pt. 7, 1951-52, p. 563-598; disc. p. 598-608.

Results of investigations on strength and stiffness include tests on rolled steel sections 9 and 12 in. in depth, in association with plating. Effect of the following variables: Various shapes of section both riv-

eted and welded; different types and sizes of end connections both bracketed and unbracketed; cutting of scallops of different depths in the webs of welded stiffeners; and cutting of slots in the webs of riveted stiffeners. (Q23, CN)

914-Q. The Influence of Silicon in Aluminium on Life of Cutting Tools. Hans Lindqvist. 4th International Mechanical Engineering Congress, June 1952, 12 pages.

A study of the wear of toolsteel when used on four Al-base alloys containing 0.35% Mg and 5, 10, 12.5, and 21% Si. Graphs and diagrams. (Q9, G17, TS, Al)

915-Q. Mechanical Properties and Applications of Sintered Parts. H. G. G. Zapf. 4th International Mechanical Engineering Congress, June 1952, 16 pages.

Deals with structural parts. Mechanical properties and production method; classification of sintered products; alloying techniques; and subsequent treatments. Mechanical and physical properties of Fe and brass parts, especially in relation to production methods; mechanical properties of Cu and C steels; Fe-Cu equilibrium; etc. Photographs, tables, and diagrams.
(H general, Q general, Fe, Cu)

916-Q. Testing of Heavy Forgings for Steam Turbine Sets by Means of Core-Drilled Rods. R. Schinn. 4th International Mechanical Engineering Congress, June 1952, 15 pages.

Quality requirements of rotors which undergo a 2-min. spin test at 3750 r.p.m. Position of test samples in the forging. Special importance of above test-rods. Ultrasonic testing. Development of forging methods. Influence of carbon segregation. Flakes. Strength of rotor core. Testing results of 15 rotors with data on mechanical properties. Hardenability tests. Microstructure. Photographs, diagrams, and tables. (Q general, T25, F22, J26, S13, M27, AY)

917-Q. Some New Methods of Static Extensometry. H. de Leiris. *Microtecnic* (English Ed.), v. 6, Sept. 1952, p. 155-164. (Translated from the French.)

Treatment of problems of stress measurement and particularly their static aspect, limited to a description of some methods and their justification. Diagrams and photographs. 12 ref. (Q27)

918-Q. Small Brinell, Rockwell and Vickers Hardness Tester. *Microtecnic* (English Ed.), v. 6, Sept. 1952, p. 184-185.

For precision machines and measuring instruments. Table and photographs. (Q29)

919-Q. (Dutch) **Copper and Copper Alloys. 8. The Mechanical Properties of Refined Copper.** W. G. R. De Jager. *Metalen*, May 15, 1952, p. 164-165; June 15, 1952, p. 196-197; July 15, 1952, p. 228-230; Aug. 15, 1952, p. 256-257.

The properties of cast Cu as compared to rolled and molded Cu. Effects of cold and hot working. Graphs. (Q general, Cu)

920-Q. (Dutch.) **The Hardness of Metals.** M. J. Druyvesteyn and M. A. Meyer. *Metalen*, v. 7, June 30, 1952, p. 203-206; July 15, 1952, p. 220-222.

Discussion of commonly used hardness numbers (Brinell, Meyer, Vickers, and Rockwell). Their interpretation and dependence on the true stress-strain curve of the metal to be tested. Effect of cold work. Hardness of single-phase alloys, with new experimental results on some Ni alloys. Factors determining the hardness of heterogeneous alloys, both annealed and chill-cast. 26 ref. (Q29)

921-Q. (French.) **Improved Basic Bessemer Steel.** Robert Langers. 4th International Mechanical Engineering Congress, June 1952, 13 pages.

A special bessemer steel blown with a mixture of oxygen and superheated steam, and refined by use of a soda slag was found equivalent to openhearth steel. Tests showed excellent suitability for cold working plus notable strain-aging resistance. Hardening by cold working, which results in an increase of brittleness, was generally less pronounced for oxygen-steam-blown double-slag treated bessemer steel, than for openhearth steel. Mechanical properties graphed.
(Q general, D3, ST)

922-Q. (French.) **Light Alloys for Use at Elevated Temperatures.** J. Valeur. 4th International Engineering Congress, June 1952, 17 pages.

Experimental data obtained in the search for new alloys with better high-temperature mechanical properties. Metals mentioned are Al, Cu, Mg, Ni, and Zr. Compares cast and wrought forms. Tables.
(Q general, SG-h)

923-Q. (German.) **Relationship of Test Results on Materials to Behavior of the Structural Part Under Service Conditions and on Its Characteristics During Shaping.** E. Siebel. 4th International Mechanical Engineering Congress, June 1952, 7 pages.

Ultimate stress values, creep behavior, toughness, such technological properties as resistance to wear, and deformability in relation to noncutting shaping. Graphical data

from the literature on soft iron and ingot steel. (Q general, Fe, ST)

924-Q. (German.) **Results of Creep Tests on Steels at 500° up to 100,000 Hours.** K. Richard. 4th International Mechanical Engineering Congress, June 1952, 31 pages.

Appearance and cause of brittle fractures at elevated temperatures. Long-time rupture tests. Long-time tensile strength and notch sensitivity of 11 steel types. Modification of testing steels for high-temperature service. Long-time yield limit, long-time damage limit, and long-time tensile-strength values for defining the properties of high-temperature materials. Graphitization. Damage to steels for high-temperature service caused by static load, and possibilities of their regeneration. Tables, graphs, and diagrams. 15 ref. (Q3, AY, SS, SG-h)

925-Q. (German.) **Photo-Elastic Investigation of New Girder Shapes Welded From Sheet Metal.** R. Albrecht. *Schweissen und Schneiden,* v. 4, Aug. 1952, p. 277-279.

Description and diagrams. Results are tabulated; their practical application. (Q25, CN)

926-Q. (German.) **Discussion of Fatigue Strength of Notched Pieces.** M. Russenberger. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 18, July 1952, p. 220-227.

Fundamental analysis of design of pieces having elements which reduce strength, such as threads, holes, sharp corners, as well as inclusions, which have a similar effect. Shows that damping is responsible to a large extent for notch sensitivity. Characteristics of the damping, and especially its variability during the fatigue stressing. (Q7)

927-Q. (German.) **Stress-Optical Investigation of Plates by a Two-Layer Process.** A. Kuske. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, Aug. 1, 1952, p. 745-747.

A modification of the photo-elastic method of determining bending stresses of plates. Photographs and graphs. 19 ref. (Q25)

928-Q. (German.) **The High Ductility State of Aluminum-Zinc-Base Alloys. Part II.** Heinz Mitbauer and Franz Sauerwald. *Zeitschrift für Metallkunde,* v. 43, July 1952, p. 244-249.

The relationships between ductility and segregation effects of conditions of casting and of degree of dispersion upon ductility, the β_3 disintegration, and physical properties were investigated at low temperatures. Proposes an interpretation of the origins of high ductility. Data are tabulated and charted. Micrographs. (Q23, Al, Zn)

929-Q. (Japanese.) **On the Theory and Its Application of Two-Dimensional Plasticity.** Yoshiaki Yamada. *Report of the Institute of Industrial Science, University of Tokyo,* v. 1, No. 5, Feb. 1951, p. 151-168.

The problem of plastic flow as a plane, or two-dimensional, problem of mathematical plasticity. A general method of solving the plane problem of plastic flow. Various types of slip lines and their features. Some examples of application of the mathematical theory of plasticity to plastic working of metals in manufacturing processes, such as wiredrawing, rolling, extrusion, and ironing of metal cups. (Q24, F general)

930-Q. (Japanese.) **Studies on Zinc-Base Die-Casting Alloys.** Masao Kato. *Report of the Institute of Industrial Science, University of Tokyo,* v. 1, No. 9, Mar. 1951, p. 274-303.

The alloy systems used so far universally as Zn-base die-casting alolys are Zn-Al and Zn-Al-Cu. Since Cu-containing alloys have the disadvantage of embrittlement due to aging, more attention should be given to Zn-Al alloys. Results of a comprehensive study on mechanical properties and corrosion resistance of the different compositions, including effects of impurities such as Pb, Cd, Mg, and Fe. Similar experiments were made on permanent-mold and die castings. Solution attack of the molten alloys on ferrous metals was also studied. Graphs and micrographs. 30 ref. (Q general, R general, Zn, Fe)

931-Q. (Russian.) **Equations of the Theory of Plasticity in Relationship to Temperature Changes.** N. S. Fastov. *Doklady Akademii Nauk SSSR,* new ser., v. 85, July 1, 1952, p. 67-70.

A mathematical discussion. (Q23)

932-Q. High Strength Light Alloys. P. G. Giles and P. F. Kiddle. *Aircraft Engineering,* v. 24, Sept. 1952, p. 265, 273.

Problems arising from use of Al-Zn-Mg-Cu and duralumin-type alloys including stress, strain, loss of ductility, and aging. Tables and graph. (Q23, Al)

933-Q. The Design of Flexible Disk Misalignment Couplings. P. H. W. Wolff. *Institution of Mechanical Engineers, Proceedings* (Applied Mechanics Div.), v. 165, W.E.P. 67, 1951, p. 165-174; disc., p. 174-175.

Results of calculations to determine the increase in operating range of a disk coupling with skew mis-

alignment which would be obtained by tapering the disks. Results concerning the stresses due to "umbrella" deflections, the vibration frequencies of tapered disks, and the torque buckling of disks of constant thickness are also presented. All results were obtained by integration of the general differential equation for disk bending. Photographs and graphs. (Q23, ST)

934-Q. Extension of the Simple Plastic Theory to Take Account of the Strain-Hardening Range. J. W. Roderick and J. Heyman. *Institution of Mechanical Engineers, Proceedings* (Applied Mechanics Div.), v. 165, W.E.P. 67, 1951, p. 189-197.

Experiments in which four steels were tested for tension and stress-strain relations through the plastic range. Information gave support to theoretical work, in which behavior of these steels in flexure can be correlated with the tensile properties. Diagrams, graphs, and tables. (Q27, ST)

935-Q. New Magnesium Alloy. *Metal Industry,* v. 81, Aug. 29, 1952, p. 169-170.

Mechanical properties are tabulated and graphed for Magnesium Elektron Limited's new alloy, Elektron ZT1. It is a Mg-Zr-Zn-Th alloy recommended for use in castings for the range 250-350° C. It was developed for jet engines and has high creep and fatigue resistance. (Q general, T25, Mg, SG-h)

936-Q. Economy of Steel. J. F. Baker and B. G. Neal. *Research,* v. 5, Sept. 1952, p. 412-418.

Behavior of structures in the plastic range (i.e. preceding collapse) can be used in developing a direct method of design based on calculation of collapse load. Where strength of structure is the sole design criterion, economy can be achieved by application of the plastic methods. Diagrams and graphs. 14 ref. (Q23, ST)

937-Q. High-Duty Irons Reduce Costs. C. E. Herington. *Steel,* v. 131, Sept. 15, 1952, p. 94-96.

Advantages of high-strength irons with respect to wear resistance, ability to stand up under heat, and ability to withstand repeated impact. Applications in rolls, dies, and jigs. (Q23, CI)

938-Q. The Creep of Some Non-Ferrous Metals and Their Alloys. K. Löhberg. 4th International Mechanical Engineering Congress, June 1952, 10 pages.

Previously abstracted from *Metall;* see item 859-Q, 1952. (Q3, Pb, Cu, Al, Mg. Zn)

939-Q. Origination and Prevention of Flow Lines in the Drawing of Brass and Nickel-Silver Hollow Ware. R. Ergang. 4th International Mechanical Engineering Congress, June 1952, 10 pages.

Includes discussion of flow-lines in steel, iron, and brass; survey of tension-dilatation-curves of brass and nickel silver with simultaneous, subjective observation of stretcher-strains; and influence of various heat treatments, grain size, testing velocity, and aging at room temperature. Graphs and photographs. (Q24, G4, Cu, Fe, ST)

940-Q. Possibilities for Further Improvement of High-Strength, Weldable Structural Steels. F. Nehl. 4th International Mechanical Engineering Congress. June 1952, 16 pages.

Mechanical properties of structural steels in relation to structure and alloying elements; weldability; and post-weld mechanical properties. Development and mechanical properties of new Al steels suitable for welded construction. Development and properties of a Cu-Ni-Mo steel with excellent weldability, in contrast to other heat treatable steels. Graphs. (Q general, K9, CN, AY)

941-Q. Potential Applications of Boron-Treated Steels. A. Dammer and E. Theis. 4th International Mechanical Engineering Congress, June, 1952, 15 pages.

A series of basic tests made in Germany on boron steels cover deoxidizing and denitriding conditions; influence of increasing amounts of Mn, Cr, Mo, and Ni on hardening characteristics of B-free and B-alloyed grades of carburizing and heat treatable steels; mechanical properties and hardness. Applicability of boron steels. Tables and graphs. (Q general, T general, D general, AY)

942-Q. Resistance to Wear of Copper and Copper Alloys. Olof Hindbeck. 4th International Mechanical Engineering Congress, June 1952, 5 pages.

Resistance to mechanical wear for ten different Cu alloys was studied by having a rotating steel wheel rub with constant load and varying testing times against the flat ground surface of test bars. Table and graph. 10 ref. (Q9, Cu)

943-Q. Some Factors Determining the Choice of Materials and Methods for Mass Production of Non-Ferrous Details. B. Starck. 4th International Mechanical Engineering Congress, June 1952, 10 pages.

Dependence of manufacturing costs on workability (covers cast-

ings, extruded sections, forgings, and machining). Manufacture of a high-speed brass valve housing as an example of suitable application of good workability of nonferrous material. Dependence of material costs on properties (with diagrams of rupture details of Al castings). Dependence of material costs on workability. Materials discussed include alloys of Mg, Al, Cu, and Zn. (Q23, Al, Mg, Cu, Zn)

944-Q. The Time Stability of High-Temperature Steels. H. Holdt. 4th International Mechanical Engineering Congress, June 1952, 11 pages.

Graphs and tables show results of long-time creep tests with Cr-Ni-Mo steel; ultimate stresses and elongations after rupture during long-time creep tests (tension) for Cr-Ni-Mo, Cr-Mo, and Cr-Mo-V steels; and constant creep-elongations due to tension or bending stresses of a Cr-Mo cast steel and a Cr-Mo-V-W steel. Photomicrographs of structure. Evaluation of short time tests for providing information on long-time elevated temperature behavior. (Q3, Q4, M27, AY, SG-h)

945-Q. (French.) **The Development of Gray Irons. High Strength Irons.** M. Ballay. 4th International Mechanical Engineering Congress, June 1952, 17 pages.

The available gray irons and their strength and shock resistance. Alloyed and nonalloyed gray iron, gray iron with spheroidal graphite, and the resistance of these various types to wear and friction. Tables. (Q23, Q9, CI)

946-Q. (French.) **Use of the Principle of Raising the Elastic Limit of Steels by Strain Hardening and Artificial Aging for Construction of Penstocks, and Resultant Savings.** M. Georges Ferrand. 4th International Mechanical Engineering Congress, June 1952, 30 pages.

Includes diagrams, photographs, and tabulated mechanical properties. Details of calculations are given in appendixes. (Q21, T4, ST)

947-Q. (French.) **The Physics of the Deformation of Metals.** E. N. da C. Andrade. *Revue de Métallurgie,* v. 49, July 1952, p. 469-484.

A series of experiments concerning the mechanical properties of pure and semipure metals. Diagrams, graphs, and micrographs. (Q24)

948-Q. (French.) **The Fatigue of Metals.** M. Ros. *Revue de Métallurgie,* v. 49, July 1952, p. 497-510.

Application of the Coulomb-Mohr theory to interpretation of the problem of fracture of metals in general. Macrographs. (Q7)

949-Q. (French.) **Creep Tests for the Acceptance of Nimonic Alloys for Gas Turbines.** C. W. Weaver. *Revue de Métallurgie,* v. 49, July 1952, p. 511-522: disc., p. 522-523.

Describes a new laboratory, arrangement of the apparatus, operation of the individual machines, electrical control devices, construction of the furnace, and regulation of the temperature. Diagrams and photographs. (Q3, Ni)

950-Q. (German.) **Converter Steel Refined With Pure Oxygen and Its Properties.** Wolfgang Kühnelt. *Stahl und Eisen,* v. 72, Aug. 14, 1952, p. 1004-1010.

Segregation conditions, nonmetallic inclusions, and density of ingots. Hot and cold forming properties, ductility of wire, deep drawability of sheet and strip, tensile strength, notched-bar impact strength, workability, weldability, hardenability, creep strength, etc. Graphs. (Q general, M27, M28, K9, J26, CN)

951-Q. (German.) **Properties of Steels Refined in the Converter by Blowing Pure Oxygen From the Top.** Hubert Hauttmann. *Stahl und Eisen,* v. 72, Aug. 14, 1952, p. 1011-1018; disc., p. 1019-1024.

Comprehensive tests on 12 test melts of variable composition. Tensile and impact strength, weldability, cupping, corrosion resistance, electrical properties, and magnetic properties. Numerous graphs and tables. (Q27, Q6, K9, R general, P15, P16, CN)

952-Q. (Portuguese.) **Influence of Graphite and the Matrix on Some Mechanical Properties of Common Cast Irons.** Werner Grundig. *Boletim da Associacao Brasileira de Metais,* v. 8, Jan. 1952, p. 77-107.

Tension, bending, and hardness properties were investigated in 31 common cast-iron test bars with a predominantly pearlitic or hypereutectoid matrix. Among other factors, the effect of deformation of the graphite and of degree of saturation of the metallic matrix were studied. Photographs and tables. 14 ref. (Q27, Q5, Q29, CI)

953-Q. (Portuguese.) **Examples of Industrial Application Based on the Properties and Characteristics of Nickel and Its Alloys.** Horace A. Hunnicutt. *Boletim da Associacao Brasileira de Metais,* v. 8, Jan. 1952, p. 48-76.

Pure or semipure Ni, alloys with high and low Ni content, and their application with respect to resist-

ance to corrosion, resistance to heat, magnetic and electric effects, and improvement of their physical and mechanical properties. 37 ref.
(Q general, P15, P16, R general, Ni)

954-Q. (Russian.) **Use of Magnetic Method for Checking the Hardness of Hardened Parts.** N. A. Gutsula. *Promyshlennaia Energetika,* v. 9, Jan. 1952, p. 18.

A magnetic hardness tester. Circuit diagrams. (Q29)

955-Q. (Book.) **Abrasion Hardness.** T. A. Jaggar. 43 pages. 1950. Hawaiian Volcano Research Assn., Honolulu, T. H. (5th Special Report, Hawaiian Volcano Observatory and U. S. Geological Survey.)

After reviewing the work of sclerometry, it is shown that yielding and relative softness are the mechanical basis of what should be called malacometry. Experiments were made with diamond drills, ring cuts, end millers, and grinding wheels on minerals, woods, and steels. Diagrams, graphs, and illustrations. (Q29, ST)

956-Q. (Book.) **Resumé of High Temperature Investigations Conducted During 1948-50.** 113 pages. 1950, Timken Roller Bearing Co., Canton 6, Ohio. Gratis.

Trends in high-temperature and high-pressure steels; some metallurgical characteristics of 12-14% Cr steel; properties of a Mo-V steel; effect of hardness on rupture strength of steels at 1050° F.; metallurgical examination of various tubes after service; properties of Timken 18-12 + Ti steel; high-temperature properties of 2¼% Cr + 1% Mo and 18-8 tubes after service; elastic constants at elevated temperatures; creep and rupture tests of 10,000 hr. duration; rupture characteristics of carbon steel and Sicromo 2½; ductility of austenitic steels after cooling from 1500° F; formation of sigma phase in austenitic steels; Izod vs. Charpy impact-test results. (Q general, SS, ST, SG-b)

957-Q. (Book.) **Strain Gauges: Theory and Application.** J. J. Kock, R. G. Boiten, A. L. Biermasz, G. P. Roszbach, and G. W. Van Santen. 93 pages. 1952. (Philips Technical Library.) Cleaver-Hume Press, 42a S. Audley St., London, W. 1, England. 15s. Also Elsevier Press Inc., 402 Lovett Blvd., Houston 6, Texas. $2.75.

The most successful sections provide a detailed description of the method of cementing a strain gage to a metal surface by means of nitrocellulose cement, wiring of the gage, and an account of the inaccuracies, chiefly electrical in origin, which may occur in this method of measuring strain. Clear instructions on bonding and wiring. The remainder of the book is mainly a repetition of information already given in textbooks on the subject. (From review in *Engineering.)* (Q25)

958-Q. Strain Rosette Analysis. H. Fealdman. *Engineer,* v. 194, Sept. 12, 1952, p. 341-342.

Methods of analyzing results obtained from use of multi-element wire resistance strain gages in which separate elements are variously oriented at a point. The theory underlying the Mohr's circle representation of 2-dimensional stress and an analogous circle for strain is developed. Diagrams. (Q25)

959-Q. Strength, Structure, and Composition of Unalloyed Grey Iron. H. T. Angus. *Foundry Trade Journal,* v. 93, Aug. 28, 1952, p. 239-245; Sept. 4, 1952, p. 269-271; disc., p. 271-273.

Summary of the relationship existing between characteristic mechanical properties. Includes relationship between composition and microstructure, calculation of cooling rate and relation of cooling rate and strength. 10 ref.
(Q general, M27, CI)

960-Q. Bending of Elastoplastic Circular Plates With Large Deflection. P. M. Naghdi. *Journal of Applied Mechanics,* v. 19. *(Transactions of the American Society of Mechanical Engineers,* v. 74), Sept. 1952, p. 293-300.

A general theory for elastoplastic bending of thin circular plates with polar symmetrical loading, and a numerical integration method for complete solution of problems within scope of the general theory. Using a stress-strain curve for 24S-T aluminum which is determined experimentally, numerical solutions for bending moments, membrane forces, and deflections are obtained. Graphs and tables. 22 ref. (Q5, A1)

961-Q. Forced Lateral Vibration of Beam Carrying a Concentrated Mass. W. H. Hoppmann, 2nd. *Journal of Applied Mechanics,* v. 19 *(Transactions of the American Society of Mechanical Engineers,* v. 74), Sept. 1952, p. 301-307.

Study made of a simply supported beam with a concentrated mass attached at its mid-point. A sinusoidally time-varying force is assumed to act on the mass in a direction normal to the length of the beam. From this solution the solution for a sinusoidal pulse is derived easily. Experimental results are given for steel. Graphs and oscillograms.
(Q23, ST)

962-Q. Correlation of Creep Properties by a Diffusion Analogy. Leon

Green, Jr. *Journal of Applied Mechanics,* v. 19 *(Transactions of the American Society of Mechanical Engineers,* v. 74), Sept. 1952, p. 320-326.

Equation for above and applications. Comparison with experimental results. Creep data for Cu, Pb, Pt, Ag, Au, W, Sn, Co, and C. Graphs. 37 ref. (Q3)

963-Q. Plastic Flow in a V-Notched Bar Pulled in Tension. E. H. Lee. *Journal of Applied Mechanics,* v. 19. *(Transactions of the American Society of Mechanical Engineers,* v. 74), Sept. 1952, p. 331-336.

The distribution of stress and deformation are determined from the analysis of the motion with large strains as the initial notch width pulls down toward line contact as the test proceeds. Analysis is based on theory of flow of a so-called Saint Venant-Mises material, which flows at a constant yield limit given by Mises criterion, and obeys the Mises flow-type relationship between stress and strain increments. Experimental data on deformation of a square grid scribed on a bar. Diagrams and graphs. (Q27)

964-Q. Experiments on the Plastic Compression of a Block Between Rough Plates. J. F. Nye. *Journal of Applied Mechanics,* v. 19. *(Transactions of the American Society of Mechanical Engineers,* v. 74), Sept. 1952, p. 337-346.

Experiments designed to check theory of Hill, Lee, and Tupper. Theoretical predictions for average pressure on plates are verified by experiments, and details of strain distribution within block and positions of elastic-plastic boundaries are closely compared with theory. Material used was rolled Te-Pb containing 0.05% Te. Diagrams, graphs and photographs. (Q23, Pb)

965-Q. Thermal Stresses in Bodies Exhibiting Temperature-Dependent Elastic Properties. H. H. Hilton. *Journal of Applied Mechanics,* v. 19. *(Transactions of the American Society of Mechanical Engineers,* v. 74), Sept. 1952, p. 350-354.

An analysis of thermal stresses and strains, taking into account variations of elastic shear modulus and coefficient of thermal expansion with temperature. (Q21, P11)

966-Q. Minimum Weight of Tapered Round Thin-Walled Columns. Morris Feigen. *Journal of Applied Mechanics,* v. 19. *(Transactions of the American Society of Mechanical Engineers,* v. 74), Sept. 1952, p. 375-380.

Optimum wall thickness of a cylindrical round tube column is a function of load only and is independent of diameter. Optimum wall thickness of a tapered column is found to be constant along its length. Application to 755-T Al. Graphs. (Q23, Al)

967-Q. On the Direction of Fatigue Cracks in Polycrystalline Ingot Iron. R. E. Peterson. *Journal of Applied Mechanics,* v. 19. *(Transactions of the American Society of Mechanical Engineers,* v. 74), Sept. 1952, p. 408-409.

Discussion of paper by F. A. McClintock, with author participation. (Item 628-Q, 1952). (Q7, Fe)

968-Q. Note on Ultimate Strength of Webs in Shear. R. Tatham. *Journal of the Royal Aeronautical Society,* v. 56, Sept. 1952, p. 701-703.

Experimental evidence available in N.A.C.A. Technical Notes suggests that curves of R.Ae.S Data Sheet 02.02.13 giving allowable shear stress for failure may be too high for some aluminum alloys. Pending further experimental work recommendations are made as a basis for design data. Graphs. (Q2, Al)

969-Q. Precise Measurement of Fatigue Test Load. M. H. Roberts. *Metallurgia,* v. 46, Aug. 1952, p. 107-114.

Lack of precision of optical lever method of measuring alternating tension and compression in push-pull fatigue tests led to development of an electrical resistance strain gage method, using a cathode ray oscillograph, with which results reproducible to $\pm 1\%$ can be obtained. Details of method. Circuit and other diagrams, oscillograms, and tables. (Q7)

970-Q. Experimental and Theoretical Determination of Thermal Stresses in a Flat Plate. Richard R. Heldenfels and William M. Roberts. *National Advisory Committee for Aeronautics,* Technical Note 2769, August 1952, 35 pages.

Characteristics of commercially available bonded resistance wire strain gages to determine their suitability for measuring stresses under simple conditions of stress and temperature. 75S-T6 Al alloy was used. (Q25, Al)

971-Q. Theoretical Distribution of Slip Angles in an Aggregate of Face-Centered Cubic Crystals. John M. Hedgepeth. *National Advisory Committee for Aeronautics,* Technical Note 2777, August 1952, 32 pages.

Analysis of the relative frequency of occurrence of any given slip-line angle in a plastically deformed polycrystal composed of face-centered cubic crystals for the case of simple tension. Comparison is made with another theory and with experimental results for 25-0 Al alloy. Diagrams. (Q24, Al)

972-Q. Friction: Main Cause of Engine Wear. *Petroleum Processing,* v. 7, Sept. 1952, p. 1263-1266. (Based on "How Engines Wear", by J. F. Kunc, Jr., D. S. McArthur, and L. E. Moody).

Reports a study in which friction along with some mild abrasion is the principal cause of engine wear. (Q9)

973-Q. The Transfer of Metal to Plastics During Sliding. E. Rabinowicz and K. V. Shooter. *Proceedings of the Physical Society,* v. 65, sec. B, Sept. 1, 1952, p. 671-673.

Report of investigations on amount of metal transferred when a radioactive metal (steel, Cd, Ag, Zn, or Cu) is slid over surface of a plastic. (Q9, ST, Cd, Ag, Zn, Cu)

974-Q. Research Subdivision of ISTC Division XXIX Presents Data on SAE Grade 8 Bolts of Boron Steel. A. S. Jameson. *SAE Journal,* v. 60, Sept. 1952, p. 80-81.

Graphical data on mechanical properties of bolts made from 50B40 and 50B44 boron steels. Latter meet tensile strength requirements for SAE Grade 8 bolts. (Q general, T7, AY)

975-Q. (German.) **Conditions of Structure and Crystallization After Cold Deformation and Alternating Stressing.** Max Hempel, Hans-Rolf Sander, and H. M. Möller. *Stahl und Eisen,* v. 72, Aug. 28, 1952, p. 1076-1086, disc., p. 1086-1087.

Methods and problems to be solved by alternating stress tests; examination of structure and residues and X-ray examinations on mild steel in order to follow phenomena occurring within crystallites after cold deformation followed by alternating stresses; nature of precipitates within the crystallites; dependence of their appearance on magnitude and duration of alternating stress, effect of temperature; and correlation between appearance of precipitates and distinctness of interference rings on X-ray films. Work was done on mild steels. Tables, graphs, micrographs, and diffraction patterns. 14 ref. (Q25, Q24, N5)

976-Q. (Japanese.) **Internal Friction of Iron and Nickel. II. Internal Friction and Plastic Deformation of Pure Ferromagnetic Metals.** Makoto Osawa. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 16, Jan. 1952, p. 15-18.

Metals were subjected to plastic deformation of various degrees. Internal friction was measured by means of resonance of longitudinal oscillation. (Q22, Fe, Ni, SG-n, p)

977-Q. (Japanese.) **Theory of Breaking Strength. I. Static Strength.** Hideji Suzuki. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 16, Jan. 1952, p. 19-23.

A formula relating breaking strength of a crystal to its thermodynamic properties was developed and successfully applied to tensile testing of specimens under internal stress or hydrostatic pressure. Graph and diagrams. (Q27)

978-Q. (Japanese.) **Studies on the Solid Retainer Materials for Ball Bearings. I. Wearing Properties of Various Metals and Alloys Against Quenched Chromium Bearing Steels.** Toranosuke Kawaguchi. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 16, Jan. 1952, p. 30-34.

Thirteen Cu-base, eight Al-base, and five ferrous alloys were evaluated for their wear and tensile properties. Order of merit is given. Tables and graphs. (Q9, Cu, Al, Fe)

979-Q. (Japanese.) **Mechanism of Shearing of Metal as Indicated by Microstructure and Hardness Distribution.** Waichi Ota. *Nippon Kinzoku Gakkai-Si* (Journal of the Japan Institute of Metals), v. 16, Jan. 1952, p. 51-56.

Results of investigation for Armco iron and steel are tabulated and illustrated by photomicrographs. (Q2, M7, Q29, Fe, ST)

980-Q. Testing Machine Setups Duplicate Operating Conditions. *Automotive Industries,* v. 107, Oct. 1, 1952, p. 50-52, 142, 145.

Several simulated service-test fixtures which have been designed for use on fatigue testing machines. Diagram shows cross section of a simulated service fatigue test of a rubber motor mount. (Q7)

981-Q. Aerodynamic Heating in High Speed Flight. M. A. Sulkin. *Aviation Age,* v. 18, Sept. 1952, p. 28-29.

Problems arising from the so-called "thermal barrier", successor to the well-known "sonic barrier" which plagued aircraft designers in the 1930's. Includes some data on variations with temperature of strength and strength-weight ratio for Al, Ti, and steel. (Q23, T24, Al, Ti, ST)

982-Q. Some Mechanical and Adhesive Properties of Indium. A. C. Moore. *British Journal of Applied Physics,* v. 3, Sept. 1952, p. 299-301.

Experiments show that (in absence of surface contamination) adhesion between indium and metal surfaces depends only on area of contact and on time of breaking. Detailed behavior may be correlated with creep properties of indium. Experimental results also given for a number of nonmetals. Relationship to friction. 10 ref. (Q9, Q3, In)

983-Q. Photoelastic Investigation of Transversely Loaded Plates by the Double-Layer Method. A. Kuske. *Engineers Digest,* v. 13, Sept. 1952, p. 307-308. (Translated and condensed from *Zeitschrift des Vereines Deutscher Ingenieure)*

Previously abstracted from original. See item 927-Q, 1952. (Q25)

984-Q. Metal Transfer and Wear. I. Ming Feng. *Journal of Applied Physics,* v. 23, Sept. 1952, p. 1011-1019.

A newly developed theory of metal transfer and wear and the experimental support. Material used was 70-30 brass in the annealed condition. Optical micrographs. 11 ref. (Q9, Cu)

985-Q. The Separation of Stacking Fault Broadening in Cold-Worked Metals. B. E. Warren and B. L. Averbach. *Journal of Applied Physics,* v. 23, Sept. 1952, p. 1059.

Technique for separating above broadening effect occurring in X-ray reflections due to slip on planes in face-centered cubic metals. Data for a 2% Si copper alloy. Graphs. (Q24, Cu)

986-Q. Effect of Specimen Length on the Strength of a Material With Random Flaws. K. E. Puttick and M. W. Thring. *Journal of the Iron and Steel Institute,* v. 172, Sept. 1952, p. 56-61.

Problem is considered as essentially that of predicting the mean and standard deviation of strengths of chains from a knowledge of characteristics of individual links. Theoretical discussion. Experimental data on cold-drawn phosphor-bronze wire. Appendix deals with cases where weakest-link theory is not appropriate. Graphs. (Q23, Cu)

987-Q. Properties of Cast Steels Improved With Rare Earth Element Additions. G. A. Lillieqvist and C. G. Mickelson. *Journal of Metals,* v. 4, Oct. 1952, p. 1024-1031.

Survey shows that addition of Ce, La, Pr, Nd, and Sm to cast steels improves ductility, impact strength, inclusions, hot tears, fluidity, sulfur reduction, porosity, weldability, and feedability. Tables, graphs, diagrams, and photographs. (Q general, E25, C1, EG-g)

988-Q. Kinking in Zinc Single-Crystal Tension Specimens. Jack Washburn and Earl R. Parker. *Journal of Metals,* v. 4, Oct. 1952, *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 1076-1078.

Kinking was observed under conditions of low stress and high temperature. Relationship to other plastic bending phenomena on basis of dislocation theory. Experiments on stress-induced motion of small-angle boundaries. Diagrams and micrographs. 13 ref. (Q27, Zn)

989-Q. Formation of Nitrides From Atmospheric Exposure During Creep Rupture of 18 Pct Cr-8 Pct Ni Steel. E. J. Dulis and G. V. Smith. *Journal of Metals,* v. 4, Oct. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 1083-1084.

990-Q. Dynamic Formation of Slip Bands in Aluminum. N. K. Chen and R. B. Pond. *Journal of Metals,* v. 4, Oct. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 1085-1092.

Experimental apparatus by which progressive formation of slip bands can be recorded while specimen is undergoing deformation. Qualitative and quantitative data on dynamic formation of slip bands is presented with special interest concerning propagation of slip bands, spacing of slip bands, and their relations to strain hardening. Views on formation of slip bands. A mechanism of the unit process involved in formation of a slip band is proposed. Micrographs and graphs. 10 ref. (Q24, Al)

991-Q. Mechanical Properties of Intermetallic Compounds at Elevated Temperatures. Robert Lowrie. *Journal of Metals,* v. 4, Oct. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 1093-1100.

Most of the intermetallic compounds investigated exhibited extensive plastic deformation at elevated temperatures. Correlations of tensile strength and elongation were attempted with melting temperature, valence electron configurations of component elements, heat of formation, crystal structure, density, and volume decrease accompanying compound formation. Those investigated were Al_7Cr, Al_4Cr, Cr Sb, $Cu_{17}Al_9$, Cu_5Ca, Cu_2Mg, Cu_3P, Cu_3Si, Ni_3Si, $Ni_3Si + Ni_5Si_2$, Ni_5Si_2, and Ni_2Si. Diagrams, graphs, tables, and micrographs. 30 ref. (Q23)

992-Q. Mass Production. B. Starck. *Metal Industry,* v. 81, Sept. 5, 1952, p. 187-190.

See abstract of "Some Factors Determining the Choice of Materials and Methods for Mass Production of Non-Ferrous Details", 4th International Mechanical Engineering Congress, June 1952. See item 943-Q, 1952. (Q23, Al, Mg, Cu, Zn)

993-Q. Designing Magnesium Castings and Forgings. George L. Moore.

Modern Metals, v. 8, Sept. 1952, p. 62-64, 66.

See abstract under similar title, Engineer Research and Development Laboratories (Ft. Belvoir, Va.), "The Magnesium Symposium"; item 891-Q, 1952.
(Q general, E general, F22, Mg)

994-Q. Theory of Slip-Band Formation. John C. Fisher, Edward W. Hart, and Robert H. Pry. *Physical Review,* ser. 2, v. 87, Sept. 15, 1952, p. 958-961.

The fine structure of slip bands on surfaces of plastically deformed crystals is explained in terms of model of dislocation-loop generation proposed by Frank and Read. Backstress produced by an expanding avalanche of about 300 dislocation loops is shown to be sufficient to stop dynamic loop generation at the source. (Q24)

995-Q. (French.) **Tensile Testing of Drill Pipes.** F. Peyssart. *Third World Petroleum Congress, Proceedings,* Sec. II, 1951, p. 25-29.

Use of specially designed hydraulic apparatus. (Q27)

996-Q. Strain Patterns in Charpy Impact Specimens of 0.20 Pct C Mild Steel. E. S. Bumps. *Journal of Metals,* v. 4, Oct. 1952; *Transactions of American Society of Mechanical Engineers,* v. 194, 1952, p. 1067-1070.

Strain patterns illustrating various stress conditions in partially deformed Charpy specimens are presented along with a discussion of possible dependence of transition energy on the yield phenomenon. Macrographs. (Q6, CN)

997-Q. Effect of Strain-Temperature History on the Low-Temperature Properties of Ingot Iron. *Welding Journal,* v. 31, Sept. 1952, p. 439s-440s.

Previously abstracted from an article by G. W. Geil and N. L. Carwile, *Journal of Research of the National Bureau of Standards.* See item 758-Q, 1952. (Q27, Fe)

998-Q. The Initiation and Propagation of Fatigue Cracks in Mild Steel Pieces of Square Section. H. L. Cox and J. E. Field. *Aeronautical Quarterly,* v. 4, Aug. 1952, p. 1-18.

An investigation to determine positions and directions of propagation of fatigue cracks, and to examine correlation between these positions and directions and the planes on which maximum tensile and maximum shear stresses are generated. Diagrams, graphs, and photographs. (Q7, CN)

999-Q. Hydrogen Embrittlement Tests on Various Steels. F. A. Prange. *Corrosion,* v. 8, Oct. 1952, p. 355-357; disc., p. 357-360.

Cathodic embrittlement tests were made on a number of alloys having good properties for use in deep corrosive wells. Maximum hardness for use in embrittling environments should be Rockwell C-20. Micrographs and tables.
(Q23, SS, AY, CN)

1000-Q. Relative Grain Translations in the Plastic Flow of Aluminium. W. A. Rachinger. *Journal of the Institute of Metals,* v. 81, Sept. 1952, p. 33-41.

Geometry of plastic deformation in the interior of a polycrystalline aggregate investigated by means of a grain-counting technique. Behavior of surface regions of a polycrystal subjected to high-temperature creep conditions has been studied also. Photomicrographs. 15 ref.
(Q24, M27, Al)

1001-Q. The Young's Modulus, Poisson's Ratio, and Rigidity Modulus of Some Aluminium Alloys. N. Dudzinski. *Journal of the Institute of Metals,* v. 81, Sept. 1952, p. 49-55.

Elastic properties of various binary and ternary Al-base alloys. With exception of Ca, Sr, and Mg, all alloying elements investigated were found to enhance value of Young's modulus of binary alloys, Cr having greatest effect. Experimental data and results. Structure. Tables and photomicrographs. 10 ref.
(Q21, Al)

1002-Q. The Institute of Petroleum Gear Lubrication Symposium. Part I. The Lubrication of Gears. *Journal of the Institute of Petroleum,* v. 38, Aug. 1952, p. 606-668; disc., p. 668-698.

Following papers presented: "Hydrodynamic Theory in Gear Lubrication", A. Cameron; "Gear-Tooth Wear", G. I. Finch and R. T. Spurr; "Criteria Governing Scuffing Failure", F. T. Barwell and A. A. Milne; "Some Factors Affecting Gear Scuffing", H. D. Mansion; "Note on Performance of Graphited Oil", E. A. Smith; and "The Wear and Pitting of Bronze Disks Operated Under Simulated Worm-Gear Conditions", L. S. Evans and R. Tourret. Tables, diagrams, photomicrographs, photographs, and references. (Q9)

1003-Q. Properties of Commonly Used Spring Materials. *Materials & Methods,* v. 36, Sept. 1952, p. 141, 143.

Data sheet dealing with mechanical properties and applications of a wide variety of spring materials, both ferrous and nonferrous.
(Q general, T7, SG-b)

1004-Q. Correlation of Tensile Strength, Tensile Ductility, and Notch Tensile Strength With the Strength of Rotating Disks of Several Designs

in the Range of Low and Intermediate Ductility. Arthur G. Holms and Andrew J. Repko. *National Advisory Committee for Aeronautics.* Technical Note 2791, Sept. 1952, 30 pages.

Burst tests were conducted on several designs of sound disks and disks with defects. Results were compared with tensile strength, tensile ductility, and notch tensile strength. Purposes were to determine extent to which disk strength can be increased by increasing tensile strength, the extent to which a correlation exists between disk strength and several mechanical properties of materials at low ductilities, and the influence of several types of stress concentration on strengths of disks made from ductile and brittle materials. Materials investigated were SAE 4150 steel, a toolsteel, a die steel, Inconel "X", and 18-8 stainless.
(Q27, AY, TS, SS, Ni)

1005-Q. The Indication of Directional Properties by Hardness Testing. P. Grodzinski. *Sheet Metal Industries,* v. 29, Oct. 1952, p. 903-914.

Historical survey, modern investigations. and directional hardness of rolled Cu and a single Cu crystal. Tables, graphs and micrographs. 15 ref.
(Q29, Q24, Cu)

1006-Q. (Book.) **Strength of Materials. Ed. 2.** John W. Breneman. 140 pages. 1952. McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y.

An elementary text, not requiring mathematics beyond trigonometry. For this edition parts of the material have been rewritten and expanded. Problems have been improved. Coverage includes riveted and welded connections and problems and discussion on various metals. (Q23)

1007-Q. Surface Effects in Plastic Deformation of Metals. A. F. Brown. *Advances in Physics,* v. 1, Oct. 1952, p. 427-479.

Experiments in which Al was used to discover whether internal slip has any relation to surface slip. Reviews previous work using Zn, Cd, brass, and Sn. Theories of the spacing and origin of slip bands. Graphs, diagrams, and micrographs. 78 ref. (Q24)

1008-Q. Alloying Ferritic Steels for Creep Resistance. H. W. Kirkby. *Alloy Metals Review,* v. 8, Sept. 1952, p. 2-8.

Creep resistance of carbon and alloy steels with additions of Mo, Va. W, and Cr in varying amounts and combinations. Points out that higher Cr steels are more corrosion resistant than low-alloy steels. Graphs and tables. 16 ref.
(Q3, R general, CN, AY)

1009-Q. Comparisons at Elevated Temperatures of Some Commercial Grades of Ferritic Cast Steels. H. W. Wyatt, J. W. Bolton, and M. L. Steinbuch. *American Society of Mechanical Engineers,* Paper 52-SA-53, Apr. 9, 1952, 14 pages.

Some direct mechanical test comparisons of cast steel Grades WC4, WC5, WC6, and WC9 of ASTM Specification A217-49T. Materials studied are from commercial heats. All variables in manufacture, treatment and composition (aside from prescribed "alloy elements") are held as closely alike as possible. Tests show that, at temperatures under consideration, nominal 1% Mo grades WC-5 and WC-9 are higher in "creep strength" than nominal 0.5% Mo grades WC-4 and WC-6. Grade WC-5 showed, in this direct comparison, higher "stress-rupture strength" than the other three grades. Tables and graphs. 37 ref.
(Q3, Q4, CI)

1010-Q. A Survey of "Statistical Effects" in the Field of Material Failure. Waloddi Weibull. *Applied Mechanics Reviews,* v. 5, Nov. 1952, p. 449-451.

Theoretical discussion and literature review. 63 ref.
(Q general, S12, S21, ST, CI)

1011-Q. Curves for the Determination of the Stresses in Rotating, Nonuniformly Heated, Disks by the Keller Method. F. Salzmann and W. Kissel. *Escher Wyss News,* v. 23-24, 1950-51, p. 69-82.

Includes mathematical details of development and use. (Q25)

1012-Q. Investigation of Materials for Steam Turbine Manufacture. W. Stauffer. *Escher Wyss News,* v. 23-24, 1950-51, p. 91-97.

Facilities of the Escher-Wyss organization. Typical data are tabulated, charted, and illustrated. Includes mechanical testing, nondestructive testing, metallographic and spectrographic investigations.
(Q general, S13, S11, M21, T5)

1013-Q. Study Metal Behaviour With Large Metal Crystals. Robert Maddin and N. K. Chen. *Iron Age,* v. 170, Oct. 23, 1952, p. 108-111.

How plastic behavior of metals is being studied at Johns Hopkins University. Single crystals of high-melting-point metals such as Mo, Ta, Cb, and W have been grown. Typical is Mo metal. The commercial pressed sintered and arc-melted product is brittle. But pure Mo crystals can be extended 57%, rolled

98%. Includes information on Al, brass, and other metals. Graphs, micrographs, and macrographs. (Q23, H general)

1014-Q. Sigma-Phase Embrittlement in 25 Cr-20 Ni Heat-Resisting Steels. J. I. Morley and H. W. Kirkby. *Journal of the Iron and Steel Institute,* v. 172, Oct. 1952, p. 129-142.

Metallurgical observations relating to occurrence of sigma phase in ferrite-free Cr-Ni bar steels. Effect of variable grain size arising from different annealing temperatures on distribution of constituents, on their rates of precipitation, and on tensile and impact properties of steels after complete precipitation of carbide and sigma phases. Data show how composition of steels may be adjusted to reduce their sigma content if necessary. Graphs, tables, and photomicrographs. 10 ref. (Q23, M27, SS, SG-h)

1015-Q. Effect of Direction of Rolling, Direction of Straining, and Ageing on the Mechanical Properties of a Mild-Steel Plate. Constance F. Tipper. *Journal of the Iron and Steel Institute,* v. 172, Oct. 1952, p. 143-148.

Series of experiments was conducted to determine effects of plastic strain and aging on notch-impact strength and yield point. Direction of rolling was found to be most significant in Izod impact tests, lowering of these values after prestrain being chiefly due to work hardening and strain aging. Results charted. 16 ref. (Q general, CN)

1016-Q. Influence of Prior Strain History on the Tensile Properties and Structures of High-Purity Copper. William D. Jenkins and Thomas G. Digges. *Journal of Research of the National Bureau of Standards,* v. 49, Sept. 1952, p. 167-186.

Results of tests made to evaluate effects of prestraining different amounts in creep under tension at 110, 250, and 300° F., of cold drawing on tensile properties at room temperature, and on hardness and structures produced in fractured specimens. Tables, graphs, micrographs, and photographs. (Q27, Q24, M27, Cu)

1017-Q. New Drawing Brass Cuts Finishing Costs. S. G. Kelley, Jr. *Materials & Methods,* v. 35, Mar. 1952, p. 82-83.

"Formbrite", developed by American Brass Co., is not a new alloy, but is the result of a new process of manufacturing that can be applied to most of existing copper alloys, particularly brasses. As a brass, Formbrite can be obtained in alloys ranging from gilding metal (95 Cu + 5% Zn) to yellow brass of 63-37 Cu-Zn content. Produced by special methods of rolling or drawing and annealing, it has a grain size of 0.012 mm. or under. Very good polishing and finishing characteristics, high tensile strength, hardness, and excellent ductility are claimed. Applications. (Q23, Q29, F23, Cu)

1018-Q. "Stretcher-Strains"—Their Occurrence in Nickel Silver. R. Ergang. *Metal Industry,* v. 81, Oct. 3, 1952, p. 261-264.

Survey of stress-strain curves of nickel silver and brass and incidence of "stretcher strains" locates these phenomena in relation to yield point, elongation, and grain size of material, as well as indicating influence of time and temperature on their formation. Graphs. (Q24, Cu)

1019-Q. An Experimental Investigation of the Behavior of 24S-T4 Aluminum Alloy Subjected to Repeated Stresses of Constant and Varying Amplitudes. Herbert F. Hardrath and Elmer C. Utley, Jr. *National Advisory Committee for Aeronautics,* Technical Note 2798, Oct. 1952, 23 pages.

Device for adapting Moore rotating-beam fatigue-testing machines for tests in which amplitude of stress is continuously varied. Results are analyzed by computing summation of cycle ratios. Values obtained in this analysis were found to be influenced by shape of the frequency-distribution curve. Tables and stress curves. (Q7, Al)

1020-Q. A Theoretical and Experimental Investigation of the Influence of Temperature Gradients on the Deformation and Burst Speeds of Rotating Disks. P. I. Wilterdink, A. G. Holms, and S. S. Manson. *National Advisory Committee for Aeronautics,* Technical Note 2803, Oct. 1952, 45 pages.

Influence of temperature gradients. Validity of recently developed method of calculating plastic flow in disks by comparing calculated results with experimental observations on Inconel "X" disks. Graphs, tables, and diagrams. 14 ref. (Q24)

1021-Q. Tracer Technique for Studying Gear Wear. V. N. Borsoff, D. L. Cook, and J. W. Otvos. *Nucleonics,* v. 10, Oct. 1952, p. 67-69.

Briefly mentions previous methods of evaluating gear wear. Tracer technique in reference to apparatus, activity of gears, calibration, and procedure. (Q9, S19)

1022-Q. The Mechanism of Rolling Friction. D. Tabor. *Philosophical Magazine,* ser. 7, v. 43, Oct. 1952, p. 1055-1059.

Investigation made of friction and

surface damage produced when a hard steel ball rolls between flat parallel surfaces of a softer metal. (Q9, ST)

1023-Q. The Deformation of Silver at High Temperature. A. P. Greenough. *Philosophical Magazine,* ser. 7, v. 43, Oct. 1952, p. 1075-1082.

A new explanation of development of kinking is advanced to account for experimental observations, and it is shown that surface-energy effects can give rise to offsetting in a direction which causes wires to shorten. Tables and diagrams. 13 ref. (Q24, Ag)

1024-Q. The Mechanism of Boundary Lubrication. F. P. Bowden. *Third World Petroleum Congress, Proceedings,* sec. VII, 1951, p. 328-342.

Mechanism of metallic friction and wear, and part played by localized adhesion at points of sliding contact. Mechanism of boundary lubrication. Electron diffraction studies of structure and orientation of lubricant films. Chemical attack. Data for a variety of metals. Electron micrographs, diagrams, and tables. 22 ref. (Q9, R7)

1025-Q. The Expression of Spot-Weld Properties. Julius Heuschkel. *Welding Journal,* v. 31, Oct. 1952, p. 931-943.

Derives series of empirical solutions which permit direct expression of common mechanically determined properties of C-Mn steel spot welds for materials within ordinary thickness, strength, and composition ranges. These expressions permit direct conveyance of a large amount of test experience in a simple, terse, usable form. The equations apply only to conventional single impulse spot welding procedures on welds stressed at normal temperatures. (Q general, K3, CN)

1026-Q. The Effect of Strain-Rate on Twinning and Brittle Fracture. D. Rosenthal and C. C. Woolsey, Jr. *Welding Journal,* v. 31, Oct. 475s-492s.

Relationship of strain rate, temperature and brittle fracture in low-carbon steel as determined in simple tension. Experimental results. Diagrams, graphs, and photomicrographs. 35 ref. (Q27, Q24, CN)

1027-Q. The Nature of Cleavage Fracture in Steel. H. M. Miekkoja. *Welding Journal,* v. 31, Oct. 1952, p. 493s-501s.

Factors which affect cleavage fracture in steel are defined as artificial notches, inhomogeneities of structure, ductility of material, and its structure and composition. Experimental data for several carbon and low-alloy steels are tabulated and charted. 31 ref. (Q26, CN, AY)

1028-Q. Hard-Facing Alloys of the Chromium Carbide Type. Howard S. Avery and Henry J. Chapin. *Welding Journal,* v. 31, Oct. 1952, p. 917-930.

Engineering properties (hardness, abrasion resistance, erosion resistance, oxidation resistance, hot hardness, creep resistance, compression strength, and behavior under impact) of deposits of high-Cr iron in which C and Cr are combined to provide a considerable volume of hard carbides. Graphs, tables, and photomicrographs. 20 ref. (Q general, R general, L24, Cr, C-n)

1029-Q. Significance of the Elongation Test on Wire. Howard J. Godfrey. *Wire and Wire Products,* v. 27, Oct. 1952. p. 1015-1022, 1031.

Factors which affect the elongation test. How deformation which takes place during tensile testing can be used to measure ductility. Concerned with hard-drawn wire in the as-drawn condition and after various treatments. Graphs. (Q27, Q23, CN)

1030-Q. Creep and Relaxation of High Strength Steel Wires at Room Temperature. Gordon T. Spare. *Wire and Wire Products,* v. 27, Oct. 1952, p. 1058-1061, 1119-1120.

Nominal amounts of creep and relaxation occur in high-strength steel wires subject to high sustained stress or strain. Changes affected by various treatments of a given wire appear to be specifically related to elongation ductility. Graphs. (Q3, AY)

1031-Q. (French.) **Lubrication of Steel Surfaces Treated in a Sulfur Bath.** Frédéric Morel. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 235, July 28, 1952, p. 284-286.

Effects of sulfur bath treatment on coefficient of friction and surface finish. (Q9, ST)

1032-Q. (French.) **Temper Brittleness of Steel.** J. M. Vialle. *Metaux: Corrosion—Industries,* v. 27, July-Aug. 1952, p. 281-301.

A review on the basis of the literature. How temper brittleness manifests itself, laws governing these phenomena, and influence of various factors. Mechanism for temper brittleness. Micrographs, macrographs, and diagrams. 68 ref. (Q23, ST)

1033-Q. (French.) **Microhardness.** Adrien Saulnier. *Revue de l'Aluminium,* v. 29, July-Aug. 1952, p. 262-266.

Theoretical explanation of microhardness, or application of hardness principles to surfaces covering only a few microns. Applications and methods. Apparatus for measurement and recording. (Q29)

1034-Q. (French.) **Application of Microhardness to Some Constituents of Cast, Binary Aluminum Alloys.** Adrien Saulnier. *Revue de l'Aluminium,* v. 29, Sept. 1952, p. 301-307.

Results of a series of tests on various types of Al and Al alloys. The usefulness of microhardness for control as well as for research. Micrographs and table of test data. (Q29, Al)

1035-Q. (French.) **Properties of the Transition Point of Tensile Curves, and Its Influence on the Aging of Aluminum-Base Alloys.** B. Jaoul, F. Aubertin, and C. Crussard. *Revue de Métallurgie,* v. 49, Sept. 1952, p. 633-644; disc., p. 644-646.

Micrographic and X-ray studies were made. The influence of electric properties of Al-Mg and Al-Cu alloys. Charts and micrographs. (Q27, P15, N7, Al)

1036-Q. (German.) **Compressibility of Cast Zinc as a Function of the Angle of Compressing Direction to Direction of Crystal Growth.** Rolf Denker, Günter Falkenhagen, and Wilhelm Hofmann. *Abhandlungen der Braunschweigischen Wissenschaftlichen Gesellschaft,* v. 4, 1952, p. 87-93.

Compressibility was measured under the drop hammer at temperatures between 20 and 400° C. When perpendicularly compressed this material offers a resistance against deformation several times higher than when compressed parallel or inclined by 45° to the plane of the plate. Diagrams, photographs, and graphs. (Q28, Zn)

1037-Q. (German.) **Elastic-Plate Stress Research by Means of Photoelasticity.** R. Kuhn. *Forschung auf dem Gebiete des Ingenieurwesens,* ser. B, v. 18, no. 3, 1952, p. 72-80.

Recent developments, particularly analysis of 3-dimensional stresses by the freezing method. 13 ref. (Q25)

1038-Q. (German.) **The Problem of Design Strength in Malleable Cast Iron.** E. Mickel. *Giesserei,* v. 39, Sept. 4, 1952, p. 429-431.

Experiments were carried out on a series of simple structural elements in order to establish dynamic design strength. Experimental conditions, methods, and results. Tables, charts, and diagrams. (Q23, CI)

1039-Q. (German.) **The Significance of Submicroscopic Inclusions in the Development of High-Strength Steels for Large Steel Structures.** Nehl Franz. *Stahl und Eisen,* v. 72, Oct. 9, 1952, p. 1261-1267.

Effects of inclusions on tensile and yield strength of weldable Mn, Mn-Cu, Mn-Cu-Ni steels and in Cu-Ni steels containing 0.2-0.3% Mo or V and less than 0.03% (Ta + Cb) or Ti. (Q23, CN, AY)

1040-Q. (German.) **Effect of Aluminum on the Properties of Low-Carbon Steels.** Kurt Born and Walter Koch. *Stahl und Eisen,* v. 72, Oct. 9, 1952, p. 1268-1277.

Effects of small Al additions on strength properties of low-carbon steels, methods of analyzing oxide inclusions and nitrides, and electron-microscope examination. Photomicrographs and charts. (Q23, M21, CN)

1041-Q. (German.) **Frequency Curves for the Yield Point of Structural Steel St 37.** Günter Markiefka. *Stahl und Eisen,* v. 72, Oct. 9, 1952, p. 1302-1303.

A statistical analysis of 4232 yield point determinations on a structural steel. (Q23, CN)

1042-Q. (German.) **Basic Problems of Wear.** Wilhelm Späth. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, Sept. 1, 1952, p. 829-832.

On the basis of the literature, and various examples of wear, a general method is proposed for its calculation. Graphs. 13 ref. (Q9)

1043-Q. (German.) **Endurance Tests and Behavior of Materials Under Vibration Stress. I. Endurance Tests as a Basis for Calculations.** M. Hempel. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, Sept. 1, 1952, p. 809-815.

Details of tests on carbon, low-alloy, and stainless steels. Tables and graphs. 40 ref. (Q7, ST)

1044-Q. (German.) **Influence of Surface Roughness on the Alternating Bending Strength of Unhardened and Heat Treated Steel.** G. Niemann and H. Glaubitz. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, Sept. 1, 1952, p. 855-857.

Experimental details of a series of tests. Data are tabulated and compared with results quoted in the literature. (Q5, ST)

1045-Q. (German.) **Criteria of Incipient Slip in Polycrystalline Metals.** F. Rohner. *Zeitschrift für angewandte Mathematik und Physik,* v. 3, Sept. 15, 1952, p. 383-390.

It is shown that slip is possible without bonds being disrupted or energy being spent against bonding forces. Determinations of the elastic limit of wrought and sintered pure Al are in accordance with this theory. (Q24)

1046-Q. (German.) **Tensile Deformation of Monocrystals Using a Rotating Grip.** Jörg Diehl and Albert Kochendörfer. *Zeitschrift für angewandte Physik,* v. 4, July 1952, p. 241-247.

A new tensile-testing machine with self-aligning grips which makes it possible to determine tensile and

shear stresses in one operation. Typical results tabulated, charted, and discussed. 12 ref. (Q27)

1047-Q. (German.) On the Properties of Metallic Melts. V. The Internal Friction of Liquid Copper-Tin Alloys. *Zeitschrift für Metallkunde,* v. 43, Aug. 1952, p. 292-296.

Dependence of melt properties upon temperature and concentration. Results are tabulated and interpreted. (Q22, Cu, Sn)

1048-Q. Internal Stress in Castings. *Foundry Trade Journal,* v. 93, Oct. 23, 1952, p. 471-477.

Subcommittee report discusses some possible origins of internal stresses and presents experimental data on double-flanged bars, triangular grid castings, and hollow cylinders. Materials were Al alloys and cast steels. Graphs. (Q25, CI, Al)

1049-Q. Alloy Tool Steels With Nitrogen. *Iron Age,* v. 170, Nov. 6, 1952, p. 163-165. (Translated by S. L. Case from a Russian book published by the Central Scientific Research Institute of Technology and Machine Construction, Moscow.)

Use of N as an alloying element in special steels has practically doubled tool life under certain conditions Russian metallurgists claim in a series of papers. Nitrogen, which must be used with Al for best results, is reported to increase stability of austenite in the annealed, quenched, and in cold worked, high-Cr, high Ni steels. Additions of 0.15-0.25% N replaces 4-5% Ni in the manufacture of austenitic steels. In austenitic high-C steels, N is generally found in carbide phase. Results of tool-life tests using toolsteels of various compositions from 36 experimental melts are tabulated. Effects of repeated tempering on hardness stability of two low-alloy steels are charted.
(Q general, Q29, Q9, AY, TS)

1050-Q. Improved Ferritic Steel Can Replace Austenitic Steel. Joe Gin-Young Chow and D. W. Kaufman. *Iron Age,* v. 170, Nov. 6, 1952, p. 166-169.

A ferritic steel containing approximately 13% Cr has proved suitable for service somewhat above 1000° F., and is not weakened by sharp notches at 1000, 1100, and 1200° F. High ductility is maintained at elevated and room temperatures after long periods of exposure. Mechanical properties are tabulated and charted. Information on annealing and carbide precipitation.
(Q general, J23, N7, SS, SG-h)

1051-Q. Residual Stresses in Aluminium Alloy Sand Castings. R. A. Dodd. *Journal of the Institute of Metals,* v. 81, Oct. 1952, p. 77-81.

Study made on extent to which residual stresses in Al-alloy sand castings are determined by a number of variables. Results show that stress increases almost linearly with increase in percentage of water in molding sand; stress increases rapidly with increase in stripping time up to about 10 min., beyond which time, rate diminishes considerably, maximum stress being attained in 1 hr.; very slight increase in stress is observed with increase in pouring temperature; and mold strength exerts no effect on stress magnitude. Diagrams. 11 ref. (Q25, Al)

1052-Q. The Creep-Time Relationship Under Constant and Tensile Stress. S. Bhattacharya, W. K. A. Congreve, and F. C. Thompson. *Journal of the Institute of Metals,* v. 81, Oct. 1952, p. 83-92.

Research carried out at constant stress on Cu, Zn, Sn, Cd, Pb, Al and Pb-Sn eutectic. All results are consistent with equation: $\sigma_t = \sigma_o + at^k$, where σ_t and σ_o are, respectively, total and initial strain, t is time, and a and k are constants. Graphs. 21 ref.
(Q3, Cu, Zn, Sn, Cd, Pb, Al)

1053-Q. The Temperature Dependence of Transient and Secondary Creep of an Aluminium Alloy to British Standard 2L42 at Temperatures Between 20° and 250° C. and at Constant Stress. A. E. Johnson and N. E. Frost. *Journal of the Institute of Metals,* v. 81, Oct. 1952, p. 93-107.

A study by means of creep tests in pure torsion on thin-walled tubular specimens at a constant stress of 2 tons per sq. in., and at 50° C. intervals over the range of 20-250° C. It is concluded that for this alloy no current fundamental theory adequately describes transient creep in above range although up to 200° C. secondary creep rates agree quite well with theories based on the Eyring rate process theory. Total forward creep is well represented at all temperatures by a derived equation. Tables and graphs. 13 ref. (Q3, Al)

1054-Q. Small Additions Raise Strength of Zirconium at Elevated Temperatures. A. D. Schwope and W. Chubb. *Journal of Metals,* v. 4, Nov. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 1138-1140.

Effects of small amounts of a number of elements upon strength of Zr were studied. It was found that Mo and possibly Cb are most effective in strengthening Zr at temperatures below 500° C., but that

Al, Ta, and V are most effective above 600° C. Graphs. (Q23, Zr)

1055-Q. Ductile Iron Combines Properties of Cast Iron, Malleable Iron, Steel. *Journal of Metals,* v. 4, Nov. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 1143-1145.

Properties include mechanical wear resistance, equaling that of gray iron; resistance to heat and oxidation at elevated temperatures superior to gray iron; fatigue resistance and ability to sustain shock loads the same as ordinary steel having same yield strength; and arc weldability with techniques established for gray iron. Photographs and tables. (Q general, K1, CI)

1056-Q. Effect of Austenitic Grain Size on Nickel-Chromium Steels. A. B. Chatterjea and B. R. Nijhawan. *Journal of Scientific & Industrial Research,* v. 11B, Sept. 1952, p. 388-391.

Effect of Al additions on mechanical properties, grain growth, and thermal critical ranges of two Ni-Cr steels made from the same cast. Micrographs and graphs. 13 ref. (Q general, N3, AY)

1057-Q. Bigger Tool Steel Bars: The Inside Story. David P. Hughes. *Steel,* v. 131, Nov. 3, 1952, p. 96-97.

Up to now, high speed steel bars on forgings have been made to a maximum weight of only 500-800 lb. Latrobe Steel Co. has now produced bars as large as 10 in. diameter, 10 ft. long, and weighing over 2500 lb. They are internally sound and free of carbide segregation. Causes and control of segregation, and results of comparative impact tests. (Q general. Q6, M28, TS)

1058-Q. A Method for the Determination of Stresses Produced on Electro-Deposition by Using Electrical Strain Gauges. E. G. Ramachandran and K. V. Chinnappa. *Transactions of the Indian Institute of Metals,* v. 4, 1950, p. 173-181.

Use of bonded wire strain gages for accurate and rapid measurements of surface stresses set up in a metallic strip during plating. A theory relating strain produced in a metallic strip with thickness of plating was also developed and applied to evaluate stresses due to plating of Ni on steel. Diagrams and photographs. 11 ref. (Q25, L17, ST, Ni)

1059-Q. (English.) **The Effect of Notches on the Strength of Aluminium Alloys Under Static Tensile Loading.** J. H. Palm. *Metalen,* v. 7, Sept. 30, 1952, p. 309-316.

Notched, cylindrical tensile specimens of 24S-T and 51S-W were used in the study. Length, size, notch angle, and depth were varied. Data are charted. 12 ref. (Q27, Al)

1060-Q. (German.) **Relationships Between Aging, Notch-Impact Resistance, and Chemical Composition of Unkilled Steels.** Heinz Kornfeld. *Archiv für das Eisenhuttenwesen,* v. 23, Sept.-Oct. 1952, p. 345-350; disc., p. 350-352.

Critical evaluation of the aging behavior of 77 different cold worked steels. Correlations between average notch impact strength of aged steels and their chemical compositions, notch diameters, and degree of cold working are formulated. Tables and graphs. (Q6, N7, CN)

1061-Q. (German.) **X-Ray and Mechanical Measurements of Deformation of Gray Iron.** Viktor Hauk. *Archiv für das Eisenhuttenwesen,* v. 23, Sept.-Oct. 1952, p. 353-361.

Results of a comparative study of mechanical and X-ray measurements of deformations and stresses in gray iron subjected to tension, compression, and bending stresses. Results point to important concepts on the mechanism of gray-iron deformation. Tables, diagrams, photomicrographs, and graphs. 39 ref. (Q23, CI)

1062-Q. (German.) **Appearance of Cracks in Bent Tubes.** Wolfgang Mielentz. *Brennstoff-Wärme-Kraft,* v. 4, Oct. 1952, p. 345-348.

Alternating stresses and increased electrochemical corrosion are the two primary causes of cracking of bent boiler and steam pipes. Photographs, photomicrographs, and diagrams. (Q25, R1, AY)

1063-Q. (German.) **Notch-Impact Toughness of Light-Metal Welds.** A. Matting and A. Müller-Busse. *Metall,* v. 6, Oct. 1952, p. 586-589.

Highly pure Al, Al-Mg, and Al-Mg-Mn alloys were used to study the effect of type of notch, temperature, and previous treatment. Graphs, tables, photographs, and photomicrographs. (Q6, K9, Al)

1064-Q. (German.) **Malleable Aluminum Alloys and Their High-Temperature Creep-Stress Resistance.** R. Irmann. *Metall,* v. 6, Oct. 1952, p. 608-612.

Research results on the creep strength and fatigue strength of Al-Cu-Mg and Al-Cu-Ni alloys from room temperature to 500° C. Graphs and tabulated data. 11 ref. (Q3, Al)

1065-Q. (German.) **Indentation Hardness—Its Dependence on Load and a Suggestion for a New Definition.** P. Grodzinski. *Schweizer Archiv für angewandte Wissenchaft und Technik,* v. 18, Sept. 1952, p. 282-292.

Discusses critically the older defi-

nition of micro-indentation hardness and demonstrates validity of new definition stated as follows: Hardness is the test load, in kg. or g., which effects an indentation of unit size, e.g., 1 mm. Diagrams, tables, and graphs. 29 ref. (Q29)

1066-Q. (German.) **X-Ray Stress Measurements for Investigation of Increased Yield Point in Bending of Steel.** Richard Glocker and Eckard Macherauch. *Zeitschrift für Metallkunde,* v. 43, Sept. 1952, p. 313-316.

Experiments disprove the idea that yield point in bending is higher than the yield point in tension. Procedure of testing; data are graphed and tabulated. (Q5, Q25, ST)

1067-Q. (German.) **Flow Lines in Aluminum Monocrystals in the Range of Small Plastic Deformations.** Peter Haasen and Günther Leibfried. *Zeitschrift für Metallkunde,* v. 43, Sept. 1952, p. 317-321.

Experimental and theoretical study on monocrystalline Al wires with up to 2% elongation. Parabolic and logarithmic flow laws and peculiarities in the flow curves. Graphs. 11 ref. (Q24, Al)

1068-Q. Fatigue; Its Nature and Some Ways of Reducing Its Incidence. P. L. Litherland Teed. *Aircraft Production,* v. 14, Nov. 1952, p. 362-365.

Engineering aspects of fatigue plus tabulated data on tensile stress, fatigue limit, and fatigue resistance of carbon steels and Al alloys. Heat treatment effects for Al alloys. 15 ref. (Q7, Al, CN)

1069-Q. Fatigue Machines for Low Temperatures and for Miniature Specimens. W. N. Findley, P. G. Jones, W. I. Mitchell, and R. L. Sutherland. *ASTM Bulletin,* Sept. 1952, p. 53-55.

Design and features of following new types of fatigue testing apparatus: high-speed rotating-beam fatigue machine designed for operation at temperatures as low as —320° F.; repeated-bending fatigue machine for tests at temperatures as low as —320 ° F., equipped for tests in bending, torsion, or combined bending and torsion; and repeated-bending fatigue machine equipped with suitable fixtures to permit tests on miniature specimens ¾ in. long in either bending or torsion. Diagrams and photographs. (Q7)

1070-Q. Surface Effects in the Slip and Twinning of Metal Monocrystals. John J. Gilman and T. A. Read. *Journal of Metals,* v. 4, Aug. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 875-883.

Experiments described pertain to (*a*) effect of a crystal's shape on its plastic deformation, and (*b*) effect of metallic surface films on plastic deformation. For work pertaining to (*a*), crystals of Zn, Sn, and Pb were grown in various shapes. These were tested in simple tension. Macroscopic rotations about tension axis which are unpredicted by classical theory of slip were observed, and serrated edges were observed in Sn crystals. For work pertaining to (*b*), effects of evaporated and electrodeposited films of Cu, Ni, Au, and Zn on mechanical properties of Zn, Sn, and Pb crystals were determined. Films influenced both slip and twinning of crystals in creep and tensile tests. Diagrams, tables, and macrographs. 29 ref. (Q24, Zn, Sn, Pb)

1071-Q. An Engineering Method for Estimating Notch-Size Effect in Fatigue Tests on Steel. Paul Kuhn and Herbert F. Hardrath. *National Advisory Committee for Aeronautics,* Technical Note 2805, Oct. 1952, 35 pages.

An evaluation of the Neuber constant was made for a large number of fatigue tests on steel specimens for stresses near the endurance limit. Conclusion was drawn that the fatigue factor K_F at the endurance limit can be estimated for steels with reasonable accuracy by using Neuber's formula, in conjunction with the Neuber constant A. Graphs and tables. 22 ref. (Q7, ST)

1072-Q. Effects of Cyclic Loading on Mechanical Behavior of 24S-T4 and 75S-T6 Aluminum Alloys and SAE 4130 Steel. C. W. MacGregor and N. Grossman. *National Advisory Committee for Aeronautics,* Technical Note 2812, Oct. 1952, 53 pages.

SAE 4130 steel and 24S-T4 and 75S-T6 Al alloys were subjected to cyclic loading followed by various mechanical tests to determine effect of prior cycles on the transition temperature to brittle fracture for SAE 4130 steel and on energy-absorption capacity of the Al alloys; studies were made to detect the origin of failure; and auxiliary tests such as Charpy impact tests, microhardness surveys, tension tests, and fretting-corrosion studies were conducted. Tables, graphs, micrographs, and photographs. (Q general, R1, Al, AY)

1073-Q. Torsion Tests of Aluminum-Alloy Stiffened Circular Cylinders. J. W. Clark and R. L. Moore. *National Advisory Committee for Aeronautics.* Technical Note 2821, Nov. 1952, 38 pages.

Series of tests on Al alloy 24S-T3. Wall thickness of the cylinders was 0.032 in. An empirical equation is presented showing the relation between average compressive stresses in the longitudinal stiffeners and torques in the tension-field range. Some analysis of longitudinal-stiffener failures is also included. Tables, diagrams, graphs, and photographs. (Q1, Al)

1074-Q. Metallurgists Probe Causes of Stress Failure in Big-Inch Gas-Transmission Pipe. J. W. Lodge and G. K. Manning. *Oil and Gas Journal,* v. 51, Nov. 17, 1952, p. 344-346, 348-350.

Battelle Memorial Institute research in which it was found that small flat spots and dents cause large local bending stresses on application of internal pressure and that proof-testing pressure should be 150 psi. higher than maximum operating pressure. (Q5, S21, CN)

1075-Q. Yield Points in Bending Experiments on Zinc Crystals. M. J. Dumbleton and B. W. Howlett. *Proceedings of the Physical Society,* v. 65, sec. B. Nov. 1, 1952, p. 882-886.

Yield points can be observed in unstrained Zn crystals by means of a bend test when this is arranged so that premature overstraining of specimen due to stress concentrations from grips, non-axial loading, and handling, are avoided. Concludes that previous plastic deformation is not essential to appearance of a sharp yield in Zn crystals, and that failure to observe initial sharp yielding in tensile tests is due to limitations of experimental technique. (Q23, Zn)

1076-Q. Some Observations on the Yield Point in Zinc. H. L. Wain. *Proceedings of the Physical Society,* v. 65, sec. B, Nov. 1, 1952, p. 886-896.

Evidence confirming the fact that yield point of Zn is due to N_2 in solution. Theoretical prediction that a yield point should appear in a susceptible crystal without prior deformation is verified experimentally, and an explanation is given of the appearance of yield point in a specimen even though free dislocations have been introduced subsequent to aging. Graphs. 17 ref. (Q23, Zn)

1077-Q. Deformation and Fractures Produced by Intense Stress Pulses in Steel. W. M. Evans. *Research,* v. 5, Nov. 11, 1952, p. 502-509.

High-explosive charges were used in the investigation. Characteristic fractures are illustrated. (Q26, CN)

1078-Q. New Alloy Tough in the Hot Spots. *Steel,* v. 131, Nov. 1952, p. 90-91.

Ni alloy NA22H is heat resistant at unusually high temperatures. Composition is approximately 0.5% C, 26% Cr, 46% Ni, 1.4% Mn, 1.0% Si, and 53% W. Tensile and creep strength, oxidation resistance at 2200° F., thermal expansion, weldability, and applications. (Q27, Q3, P11, K9, T general, Ni)

1079-Q. Temper Brittleness in Low-Alloy Steel Weld Metal. Richard P. Wentworth and Hallock C. Campbell. *Welding Journal,* v. 31, Nov. 1952, p. 505s-514s.

Investigated in five low-hydrogen, low-alloy weld-metal compositions. A slow notch-bend test was developed to indicate relative ductility or brittleness. By use of fracture appearance and percent contraction in width of specimen beneath notch, isothermal development of temper brittleness could be studied. (Q23, K9, AY)

1080-Q. Brittle Strength and Transition Temperature of Structural Steel. W. C. Hoeltje and N. M. Newmark. *Welding Journal,* v. 31, Nov. 1952, p. 515s-521s.

A study and interpretation of test data from wide plate tests sponsored by the Ship Structure Committee. Graphs. 14 ref. (Q23, CN)

1081-Q. Embrittlement of High-Strength Ferritic Welds. Peter P. Puzak and William S. Pellini. *Welding Journal,* v. 31, Nov. 1952, p. 521s-526s.

Investigation of the effect of thermal stress relief of high-strength ferritic welds of the Mn-Mo and Ni-Mo-V types. Graphs, tables, and photographs. (Q23, J1, AY)

1082-Q. Studies of the Crack Sensitivity of Aircraft Steels. A. W. Steinberger and J. Stoop. *Welding Journal,* v. 31, Nov. 1952, p. 527s-542s.

Investigation includes hydrogen theory; transformation cracking; cold cracking due to H diffusion into cavities of steel and transforming to molecular H_2; H_2 embrittlement; method of introducing H_2 into Al, Mg, Fe, steel, Mn, and Ni; H_2 occlusion in Al, methods of examination; postheat observations of cracking due to steam; effect of stress direction upon microcracking; and micro-cracking in mild steels. Micrographs and macrographs. (Q23, N1, CN)

1083-Q. Thermal Fatigue and Thermal Shock. Helmut Thielsch. *Welding Research Council,* Bulletin Series 10, Apr. 1952, 24 pages.

Review of published and unpublished information on characteristics of thermal fatigue and shock; effects of stresses, design, structure, carbon migration, intergranular oxidation, phase transformations, weld-

ing, etc. Describes testing procedures and occurrence of thermal fatigue and shock in various applications. Tables, graphs, and micrographs. 59 ref. (Q7, ST, SG-h)

1084-Q. Quantitative X-Ray Diffraction Observations on Strained Metal Aggregates. G. B. Greenough. "Progress in Metal Physics. Vol. 3" (Interscience Publishers, New York, 1952, p. 176-219.)

Observations made on aggregates when bulk macroscopic measurements indicate that they are elastically strained; and on plastically strained aggregates. Work was carried out on iron and mild steel at room temperature. Graphs and diagrams. 114 ref. (Q21, Q23, M22, Fe, CN)

1085-Q. (French.) **Effects of the Presence of Phosphorus on Spheroidal-Graphite Cast Irons.** Maurice Grandpierre and Henry de Bouvier. *Revue de Métallurgie*, v. 49, Oct. 1952, p. 689-698; disc., p. 698.

Effects of P on microstructure, tensile strength, elastic limit, ductility, Brinell hardness, and Young's modulus were studied. Test data are charted. Micrographs. (Q general, M27, CI)

1086-Q. (French.) **New Micro-Motion-Picture Photographic Investigations of the Deformation and Fracture of Steel.** G. A. Homes and J. Gouzou. *Revue de Métallurgie*, v. 49, Oct. 1952, p. 707-718; disc., p. 719.

Deformation and fracture by tension, bending, and notched-bar impact were studied. Micrographs and charts. 27 ref. (Q24, Q26, CN)

1087-Q. (German.) **The Friction Factor of Aluminum in Contact With Some Other Metals.** H. Kostron and F. Schlaberg. *Aluminium*, v. 28, Oct. 1952, p. 341-346.

The interdependence of friction factors for different material pairs. Data are charted and tabulated for various ferrous and nonferrous alloys in contact with Al. (Q9, Al)

1088-Q. (Italian.) **Relationship Between the Results of Creep Tests and Fatigue Tests At High Temperature for Some Types of Steel.** Andreini and A. Erra. *Metallurgia Italiana*, v. 44, Aug.-Sept. 1952, p. 299-307.

Results of experiments on a low-alloy Cr-Mo and an 18-8 stainless steel. Factors influencing fatigue resistance of steel. Data are tabulated and charted. Micrographs. (Q3, Q7, AY, SS)

1089-Q. (Italian.) **Principles for the Study of the Technological Process of Plastic Deformation.** Guiseppe Carro-Cao. *Metallurgia Italiana*, v. 44, Aug.-Sept. 1952, p. 347-353.

Principles for homogeneous and isotropic metallic substances in which the plastic deformation starts when the stress reaches a critical value. (Q24)

1090-Q. (Italian.) **Resilience Tests for High-Carbon Steels.** Davide Giaccone. *Metallurgia Italiana*, v. 44, Aug.-Sept. 1952, p. 399-421.

Impact tests, ordinarily used for mild and semihard steels, were applied to hypereutectoid steels in the hardened state. Experimental data are tabulated. (Q6, CN, AY)

1091-Q. (Italian.) **Experimental Wear and Porosity Tests of the Chromium Deposit on the Liners of Diesel-Ansaldo Motors.** Giorgio Rappini, Carlo Castello, and Giona Prencipe. *Metallurgia Italiana*, v. 44, Aug.-Sept. 1952, p. 459-469.

Series of experiments designed to establish the relationship between porosity and wear resistance. Results are tabulated and interpreted. Micrographs. (Q9, L17, Cr)

1092-Q. (Pamphlet.) **The Effect of Decarburization and Other Factors on the Fatigue Strength of Roll-Threaded Aircraft Bolts.** I. Weibull-Saab. Aircraft Co. (Linkioping, Sweden), TN-4, July 1, 1952, 19 pages.

Main operations in manufacturing roll-threaded aircraft bolts of low-alloy Cr-Mo steel. Fatigue strength of the bolts was seriously affected by certain types of laps but only slightly by decarburization. Threading after heat treating increased the fatigue limit considerably and Cd plating had a very slight effect. Tables and micrographs. (Q7, G12, AY)

1093-Q. (Book.) **Strength of Materials.** Frank J. McCormick. 177 pages. 1952. Macmillan Co., 60 Fifth Ave., New York 11, N. Y.

Presented in a way that reader may gain a more than superficial understanding of subject matter even though his mathematical preparation does not extend beyond trigonometry. Includes stress and strain, welded and riveted joints of tanks, torsion, stresses in beams, beam deflections, statically indeterminate beams, combined loading, and columns. (Q23)

1094-Q. (Book.) **Etudes des Perturbations Cristallines, Produites dans les Métaux par des Efforts Alternés.** (Studies of Structural Deformations Produced in Metals by Alternating Stresses.) Paul Laurent. 116 pages. 1952. Service de Documentation et d'Information Technique de l'Aéronautique, 2 Avenue de la Porte-d'Issay, Paris 15, France. 1000 Fr.

A hybrid between a thesis and

a research paper. Author has carried out a long series of experiments dealing mostly with metallographic changes accompanying fatigue of Al and Fe, both in torsion and in bending. He used an unorthodox testing machine, in which stress is a dependent variable determined by dimensions of the flat specimen and amplitude of strain. (From review in *Metallurgical Abstracts).*
(Q7, Al, Fe)

SECTION R

CORROSION

1-R. Weathering Tests of Tin-Zinc Alloy Coatings on Steel. S. C. Britton and R. M. Angles. *Metallurgia,* v. 44, Oct. 1951, p. 185-191.

See abstract of "Corrosion Tests on Tin-Nickel", *Metal Industry,* item 332-R. 1951. (R11, Sn)

2-R. Rotogenerative Detection of Corrosion Currents. Joseph B. McAndrew, William H. Colner, and Howard T. Francis. *National Advisory Committee for Aeronautics,* Technical Note 2523, Nov. 1951, 12 pages.

A new technique for studying corrosion phenomena. The method permits the detection of the presence of currents produced by local cells on the surface of a corroding metal specimen. (R11)

3-R. Corrosion of Fourdrinier Wire Cloth. A. G. Hose. *Paper Mill News,* v. 74, Nov. 24, 1951, p. 16, 18; *Paper Trade Journal,* v. 133, Nov. 23, 1951, p. 22-23.

Various types of corrosion found in wire cloth composed of bronze warp and brass shute. (R general, T29, Cu)

4-R. Selecting Alloys to Resist Corrosion. B. B. Morton. *Petroleum Processing,* v. 6, Nov. 1951, p. 1233-1235.

Types of alloys which are resistant to high-temperature corrosion from sulfur and organic acids and solvents. Protection of equipment in some of the newer refining methods, including solvent lubricating-oil manufacture. (R7, SG-g)

5-R. The Structure of Thin Layers of Zinc Oxide Grown on a Zinc Single Crystal. L. N. D. Lucas. *Proceedings of the Physical Society,* v. 64, Oct. 1, 1951, p. 943-945.

The fact that an electron diffraction pattern can be obtained from the Zn mother crystal through the overlying layer of ZnO makes it possible to set an upper limit to the thickness of this layer. (R2, M22, Zn)

6-R. On Acid Resisting Silicon Steel. Ichiro Iitaka and Kazuhiko Sekiguchi. *Reports of the Casting Research Laboratory,* no. 2, 1951, p. 5-6.

Results of a study on corrosion resistance of 5.5% Si steel to HCl, adding various quantities of Cu to improve the resistance. (R5, AY)

7-R. Device Aids Corrosion Study. D. H. Stormont. *Oil and Gas Journal,* v. 50, Dec. 6, 1951, p. 92.

A device which permits corrosion coupons to be readily introduced or removed from pipe lines, heater tubes, and well-head equipment while they are in service. Corrosion resistance of various steels and metals under actual operating conditions can be studied. (R11)

8-R. Metallurgical Mechanism for Mercury Stress Cracking of Copper Alloys. W. D. Robertson. *Journal of Metals,* v. 3, Dec. 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 1190-1191.

Possible mechanisms and experimental results for Cu and for brass (69% Cu). (R1, R6, Cu)

9-R. Technical Practices in Cathodic Protection. *Journal American Water Works Association,* v. 43, Nov. 1951, p. 883-896.

Fundamentals of the application of cathodic protection, and the mitigation of any electrolytic corrosion that may be caused by stray current from cathodic-protection systems. 62 ref. (R10)

10-R. Potential Measurements for Determining Cathodic Protection Requirements. Scott P. Ewing. *Corrosion* (Technical Section), v. 7, Dec. 1951, p. 410-417; disc., 417-418.

Study shows that pipe lines or other buried or submerged structures can be protected against corrosion by maintaining them at some definite potential with cathodically applied current. The exact potential

at which corrosion is stopped will vary with the environment. (R10, ST)

11-R. Sodium Hydroxide as Inhibitor of Pitting in 18-8 Stainless Steel. J. W. Matthews and H. H. Uhlig. *Corrosion* (Technical Section), v. 7, Dec. 1951, p. 419-421, disc., p. 421-422.

The pitting mechanism results from galvanic action between a major surface of passive metal acting as cathode and a small active area of metal acting as anode. Potential measurements show that NaOH depresses the noble potential of passive 18-8 stainless steel, hence diminishing the operating potential of the passive-active cell. In addition, the fast-moving hydroxyl ion reacts with any passivity-destroying corrosion products such as $FeCl_2$ at the anode, thereby blocking the chain reactions that initiate pitting. (R2, R10, SS)

12-R. Corrosion Aspects of Fusion Welded Aircraft High-Strength Aluminum Alloys. Loren W. Smith. *Corrosion* (Technical Section), v. 7, Dec. 1951, p. 423-437, disc., p. 437.

Correlates metallurgical structures resulting from the fusion welding of Al alloys with corresponding corrosion data. Results of several investigations on the corrosion resistance of fusion welded 24S, 61S, and 75S Al alloys. Tensile-strength comparisons of bare and clad welded alloys exposed to corrosive mediums in the as-welded, aged, and reheat treated conditions. 19 ref. (R general, Al)

13-R. The Mechanism of Knife-Line Attack in Welded Type 347 Stainless Steel. M. L. Holzworth, F. H. Beck, and M. G. Fontana. *Corrosion* (Technical Section), v. 7, Dec. 1951, p. 441-449.

Mechanism is based on the solid solubility of Cb in 18-8 stainless steels at high temperatures with subsequent formation of grain-boundary chromium carbide during the sensitizing treatment. This type of corrosion was observed in fuming HNO_3 and also in boiling 65% HNO_3. Experiments were conducted on regular Type 347 and extra-low-carbon Type 347 stainless steels. The latter appeared to be less susceptible to knife-line attack. 12 ref. (R2, SS)

14-R. Construction Materials That Stop Sulfuric Acid Corrosion. 1 and 2. S. W. Shepard. *Industry and Power*, v. 61, Nov. 1951, p. 99-100; Dec. 1951, p. 85-86, 132.

Types and applications of materials that help in solution of problems involving corrosion, abrasion, heat, and pressure. Limitations in the use of cast iron and steel and ways of compensating for them. (R5, Pb, CI, ST)

15-R. Alcohol vs. Construction Materials. *Chemical Engineering*, v. 58, Nov. 1951, p. 288, 290, 292-294, 296-298, 300-302, 304-305.

Introductory portion by William C. Moore is followed by the following brief articles which discuss corrosion resistance of different articles to ethyl alcohol: "Worthite", W. E. Pratt; "Hastelloy", E. D. Weisert; "Glass Lining", S. W. McCann; "Coatings", Kenneth Tator; "High-Silicon Irons", Walter A. Luce; "Durimet 20", Walter A. Luce; "Rubber", O. S. True; "Chlorimets", Walter A. Luce; "Cements", Raymond B. Seymour; "Iron and Steel", A. W. Spitz; "Nickel and Nickel Alloys", W. Z. Friend; "Stainless Steel", W. G. Renshaw; "Aluminum", J. P. Balash and E. D. Verink, Jr.; "Silicones", J. A. McHard and Leon Van Volkinburg; and "Lead", Kempton H. Roll. (R7)

16-R. The Curing of Lead Storage Battery Plates. R. H. Greenburg, F. B. Finan, and B. Agruss. *Journal of the Electrochemical Society*, v. 98, Dec. 1951, p. 474-478.

A series of experiments made to determine the effects of variations in ambient temperature on the course of the oxidation reaction. The oxide used consisted of approximately 30% metallic lead, the remainder being litharge. (R2, Pb)

17-R. Corrosion of Materials. *Gas Times*, v. 69, Oct. 19, 1951, p. 117-118.

Results reported by the director of the Gas Research Board in his 1950 report. Includes photomicrographs showing structures of Pb-Sn and Pb-Ni coatings before and after corrosion for 350 hr. at 150° C. (R9, M27)

18-R. The Causes of the Localized Character of Corrosion on Aluminium. C. Edeleanu and U. R. Evans. *Transactions of the Faraday Society*, v. 47, Oct. 1951, p. 1121-1135.

Pitting and localized attack on aluminum is explained by the autocatalytic character of the anodic corrosion reaction; theoretical considerations suggest that if anodic current density becomes high at one point, it will tend to become higher, until checked by the evolution of hydrogen, which tends to produce a film of oxides or hydroxide over the point and slow down the reaction. 29 ref. (R1, R2, Al)

19-R. The Pitting of Zinc by Distilled Water and Dilute Solutions. U. R. Evans and D. E. Davies. *Journal of the Chemical Society*, Oct. 1951, p. 2607-2614.

The vertical arrangement of pits produced on zinc by distilled water, the corrosion products, and their

formation, were studied. The vertical alignment is due to corrosion product from an upper pit lodging at points below, and screening them from oxygen; lines of pits can also be set up by the screening action of a polythene thread. A Zn disc whirled in distilled water containing oxygen suffers no pitting. In stagnant water containing oxygen under high pressure, Zn remains unchanged; at ordinary pressure, it becomes pitted. Results are explained on the basis of the theory of oxidation and corrosion advanced by Hoar and Evans. (R2, Zn)

20-R. Electrochemical Studies of Protective Coatings on Metals. Part III. The Correlation Between Conductance or Capacitance and Area of Breakdown of Paint on Steel Immersed in Sea Water. F. Wormwell and D. M. Brasher. *Journal of the Iron and Steel Institute,* v. 169, Nov. 1951, p. 228-234.

The relationship between the area of metal exposed at breaks in the paint film and measured conductance or capacitance was studied critically. (R11, R4, ST)

21-R. Chemical Plants—Protection of Steelwork. Leslie H. Griffiths. *Iron and Steel,* v. 24, Nov. 1951, p. 504-506.

Ways and means of protecting mild steel building framework against corrosion by contact with chemical vapors. Scale removal; burning, flame cleaning; priming paints; rubber coatings; binding with tape. (R10, L10, L26, CN)

22-R. Dry Oxidation and Wet Corrosion. U. R. Evans. *Nature,* v. 168, Nov. 17, 1951, p. 853-855.

Attempts to show that the above phenomena are not wholly disconnected on the basis that alloying constituents added to combat the former often prevent the latter. High-temperature oxidation, oxygen in wet corrosion, electrochemical mechanism, inhibitors, effects of sulfur and impurities. 19 ref. (R2)

23-R. Iron/Sulphide Ratios in Corrosion by Sulphate-Reducing Bacteria. C. J. P. Spruit and J. N. Wanklyn. *Nature,* v. 168, Dec. 1, 1951, p. 951-952.

An investigation on ingot iron shows that it is because of their sulfide-producing action that the bacteria stimulate corrosion. (R1, Fe)

24-R. Research on the Anodic Oxidation of Ferrochromium. II. Oxidation in Potassium Solution. III. Oxidation in Solutions of Carbonate, Bicarbonate, and Alkaline Chromate. (In French.) Jean Besson and Chu Yung Chao. *Bulletin de la Société Chimique de France,* Sept.-Oct. 1951, p. 763-772.

Two ferrochromium compositions were studied. (R5, Fe-n, Cr)

25-R. Belgian Research on Chromium-Molybdenum Steels. (In French.) P. Coheur. *Revue Universelle des Mines, de la Métallurgie des Travaux publics, des Sciences et des Arts appliques a l'Industrie,* ser. 9, v. 94, Oct. 1951, p. 336-348.

Fabrication of Cr-Mo steels for creep and corrosion resistance. Transformation curves, and effects of heat treatment, of temperature, of time, and of stress were studied. (R general, Q3, SS)

26-R. The Mechanism of Intergranular and Stress Corrosion of Aluminum-Magnesium and Aluminum-Zinc-Magnesium Alloys. (In French.) Pierre A. Jacquet. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 233, Oct. 15, 1951, p. 871-873.

New facts and their consequences as result of recent research of the author. (R2. Al)

27-R. Dissolution Rate of Iron in 0.1 N Hydrochloric Acid During the First Few Seconds. (In German.) Heribert Grubitsch and Hikka Väyrynen. *Werkstoffe und Korrosion,* v. 2, Oct. 1951, p. 362-365.

For polished test specimens, the increased dissolution rate in the first few seconds is due to presence of an oxide coating. Tests on specimen free of oxide show an increase in the initial solution rate in both aqueous and ethereal HCl. This is explained by increased reactivity of the active Fe atoms at the surface. Solubility curve of polished samples is compared with that of coarsely filed samples. 10 ref. (R5, Fe)

28-R. Phase Boundary Lines, Especially Their Significance in Corrosion. (In German.) Rudolf Auerbach. *Werkstoffe und Korrosion,* v. 2, Oct. 1951, p. 365-367.

Boundary lines for the cases of two phases having a common plane, and three phases having only a common boundary line. Adsorption in the first case and "adlineation" in the second both diminish the free energy and activity of the boundary, thus inhibiting corrosion. Application to local cells, glow cathodes, and catalysts consisting of several components. (R10, P12)

29-R. Corrosion Protection for Light Steel Construction. (In German.) Wilhelm Wiederholt. *Werkstoffe und Korrosion,* v. 2, Oct. 1951, p. 372-377.

Deals with light structural members enclosed in building structures where corrosive conditions are often unfavorable. Application of various metallic and organic coatings. (R3, L general, ST)

30-R. Measurement of the Oxide Film on Platinum. II. (In German.)

Heribert Grubitsch and Fritz Tödt. *Werkstoffe und Korrosion,* v. 2, Nov. 1951, p. 415-416.

A theory of the mechanism of oxide formation on Pt is developed. The various results of Tödt and of Grubitsch, especially the time dependence of oxygen charging of a Pt surface in an oxygen-containing electrolyte, can be explained on the basis of the theory. (R2, Pt)

31-R. Corrosion by Smelter Fumes. (In German.) Otto Gerhardt. *Werkstoffe und Korrosion,* v. 2, Nov. 1951, p. 425.

Corrosion by smelter fumes in recovery of Cu from secondary brass. Main contaminants are Zn, Pb, and Sn oxides. (R9, A8, ST, Cu)

32-R. Research on Stainless Steels. Part II. Some Measurements of Their Resistance to Intercrystalline Corrosion. (In Italian.) Antonio Ferri. *Metallurgia Italiana,* v. 43, Oct. 1951, p. 432-434.

Tests were made on three types of austenitic 18-8 steels in order to evaluate the sensitivity of the Strauss test and of tests in boiling HNO_3. The former was found to be more sensitive. The spread in corrosion results is related to a number of factors such as grain size, amount of carbide precipitation, and surface conditions of samples. 23 ref. (R2, SS)

33-R. (Book) **Corrosion Guide.** Erich Rabald. 629 pages. 1951. Elsevier Publishing Co., Inc., 445 Park Ave., New York 22, N. Y.

The old tried methods are catalogued with their advantages and deficiencies. Tabular arrangement of performance of materials in use gives the user an opportunity of finding out easily about other materials. General considerations on the selection of materials. A short introduction to the general aspects of corrosion, a knowledge of which leads to better use of the data given later. Bibliography of the most important books and journals. (R general)

34-R. Corrosion Resistance of Zirconium. Robert J. Bumbaugh. *Industrial and Engineering Chemistry,* v. 43, Dec. 1951, p. 2878-2880.

Results of an investigation to determine the effect of small amounts of O_2, N, C, and Hf. (R general, Zr)

35-R. Corrosion of Steel in Molten Sulfur. Andrew Dravnieks. *Industrial and Engineering Chemistry,* v. 43, Dec. 1951, p. 2897-2900.

Clarifies the fundamental mechanisms of sulfide formation on steel. Covers both the chemical and mechanical processes. Kinetic constants and film structure. (R6, ST)

36-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 43, Dec. 1951, p. 75A-76A, 78A.

Reviews a Russian report on the effect of acid concentration on the corrosion rate of carbon steels. (R5, CN)

37-R. H_2S and CO_2 Corrosion of Carbon Steel in Natural-Gas Processing Plants. D. E. McFaddin. *Oil and Gas Journal,* v. 50, Dec. 13, 1951, p. 97-98.

General conclusions derived from a study. (R9, CN)

38-R. Testing Wire Rope Lubricants. L. A. Bushell and P. Marais. *South African Mining and Engineering Journal,* v. 62, Oct. 20, 1951, p. 291, 293.

An investigation of corrosion and lubrication of wire ropes in Free State gold mines. Method of testing, apparatus, preliminary experiments, comparison of lubricants and results. (R7, Q9, ST)

39-R. Effect of Dilute Sulfuric Acid on Magnetized Iron. II. (In German.) G. Wagner. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften,* v. 82, Oct. 15, 1951, p. 774-784.

Results of a further study of "magnetolysis" in order to investigate the source of the oxygen evolved when magnetized iron is treated with H_2SO_4. 23 ref. (R5, P16, Fe)

40-R. Solution of Copper in Nitric Acid. II and III. (In German.) T. G. Owe Berg. *Zeitschrift für anorganische und allgemeine Chemie,* v. 266, Oct. 1951, p. 118-139.

Part II: Studies on the solubility rate of Cu in different concentrations of HNO_3 at temperatures ranging from -10 to $+30°$ C. Part III: Experiments were made with the specimen immersed in HNO_3 in different ways as well as without stirring the acid. 21 ref. (R5, Cu)

41-R. How Austenitic Nickel Cast Iron Can Serve as an Alternate for Caustic Manufacture. H. O. Teeple. *Chemical Engineering,* v. 58, Dec. 1951, p. 286.

Some mechanical properties and corrosion resistance of the Ni-Resists, a series of austenitic Ni cast irons. (R5. Q general, CI)

42-R. Aluminum Alloys for Handling and Storage of Fuming Nitric Acid. W. W. Binger. *Corrosion* (News Section), v. 8, Jan. 1952, p. 1.

Results of tests showing the resistance of Al to corrosion by HNO_3. (R6, T29, Al)

43-R. The Mechanism of Scale Formation on Iron at High Temperature. B. W. Dunnington, F. H. Beck, and M. G. Fontana. *Corrosion* (Technical Section), v. 8, Jan. 1952, p. 2-13.

Procedure and results of research. Proposes a new mechanism for high-temperature oxidation of Fe. Film formation. Photomicrographs of oxide scale on Armco iron. 18 ref. (R2, Fe)

44-R. Corrosion by Some Organic Acids and Related Compounds. H. O. Teeple. *Corrosion* (Technical Section), v. 8, Jan. 1952, p. 14-27; disc., p. 27-28.

Results of corrosion tests in various organic acids, principally those of the lower aliphatic series. Aqueous solutions of the acids and mixtures are considered. Related compounds, such as aldehydes, ketones, esters, and anhydrides. Materials of construction include the stainless steels, Cu, and Cu-base alloys, Ni and Ni-base alloys. (R5, SS, Cu, Ni)

45-R. Some Aspects of Ship Bottom Corrosion. Paul Ffield. *Corrosion* (Technical Section), v. 8, Jan. 1952, p. 29-48.

Pitting corrosion of carbon and low-alloy steels and its causes. Effects of stray currents, galvanic currents, mill scale, and Cu-bearing paint. Cathodic protection. 43 ref. (R4, CN, AY)

46-R. Performance Studies on Sulfur Jointing Compounds. Raymond B. Seymour, Walter Pascoe, W. J. Eney, A. C. Loewer, Robert H. Steiner, and R. D. Stout. *Journal, American Water Works Association,* v. 43, Dec. 1951, p. 1001-1014.

The problems of disintegration, stress and strain, and corrosion of cast iron pipe cemented joints made with sulfur compounds. Illustrations and graphs. 24 ref. (R general, Q25, CI)

47-R. Volatile Crystals Prevent Corrosion of Packaged Steel Parts. Philip O'Keefe, Jr. *Materials & Methods,* v. 34, Dec. 1951, p. 84-86.

A new method of preventing the corrosion of packaged steel articles by moisture. The vapor from the crystals condenses on the metal surfaces or dissolves in condensing moisture. The steel must be enclosed, although hermetic sealing is not necessary. Can be applied as a powder, dissolved in alcohol and sprayed into solution for metal dips, or used as a coating on wrapping papers. Properties, test results, and industrial applications. (R10, ST)

48-R. Progress in Corrosion Prevention. W. H. J. Vernon. *Metal Progress,* v. 60, Dec. 1951, p. 80-81.

Use of $NaCrO_4$, sodium benzoate, and $NaNO_2$ as corrosion inhibitors for steel and cast iron. (R10, ST, CI)

49-R. Oxidation in the Presence of Molybdenum Oxide. *Metal Progress,* v. 60, Dec. 1951, p. 158, 160, 162. (Condensed from "Rapid Oxidation of Metals and Alloys in the Presence of Mo_3," G. W. Rathenow and J. L. Meijering.)

Previously abstracted from *Metallurgia.* See item 411-R, 1950. (R2, Al, Cu, Ag)

50-R. The British Non-Ferrous Metals Research Association. G. L. Bailey. *Research,* v. 4, Dec. 1951, p. 569-572.

Reviews corrosion investigations carried on by the Association on galvanized steel and copper pipes. Includes brief discussion of researches on creep of metals. (R general, Q3, ST, Cu)

51-R. Relations Between Solution Potentials and Susceptibility of Stainless Steel to Selective Corrosion. L. R. Standifer, F. H. Beck, and M. G. Fontana. *Engineering Experiment Station News* (Ohio State University), v. 23, Oct. 1951, p. 17-19, 47.

Pitting and intergranular corrosion. Experimental procedures and results. Diagrammed. (R2, SS)

52-R. Cause and Cure of Knife-Line Attack in Columbium Stabilized Steels. M. L. Holzworth, F. H. Beck, and M. G. Fontana. *Engineering Experiment Station News* (Ohio State University), v. 23, Oct. 1951, p. 20-22, 47.

See abstract from *Corrosion* (Technical Section), item 13-R, 1952. (R2, SS)

53-R. Contribution to the Theory of Cathodic Protection. Carl Wagner. *Journal of the Electrochemical Society,* v. 99, Jan. 1952, p. 1-12.

Distribution of the electrical potential inside an electrolytic solution was calculated for typical cases of cathodic protection with the aid of an auxiliary metal. These calculations are used to work out equations and diagrams which permit prediction of the maximum extension of metallic surfaces for which cathodic protection can be accomplished. 16 ref. (R10)

54-R. Resistance of Titanium to Sulfuric and Hydrochloric Acids Inhibited by Ferric and Cupric Ions. Joseph R. Cobb and Herbert H. Uhlig. *Journal of the Electrochemical Society,* v. 99, Jan. 1952, p. 13-15.

Fe^{+++} and Cu^{++} ions are effective inhibitors for the corrosion of Ti in boiling 10% H_2SO_4 and boiling 10% HCl. Although the inhibitors are consumed as Ti corrodes, the consumption is moderate, particularly at the higher inhibitor concen-

trations corresponding to low corrosion rates. The primary mechanism, as indicated by potential measurements, is believed to involve adsorption of Fe^{+++} or Cu^{++} on the metal surface with accompanying satisfaction of surface valences and formation of a dipole layer with negative charge outward accounting for a noble potential. (R10, Ti)

55-R. Metal-Solution Potentials of Nickel in Foreign Ion Solutions and the Mechanism of Nickel Corrosion. D. MacGillavry, J. H. Rosenbaum, and R. W. Swenson. *Journal of the Electrochemical Society,* v. 99, Jan. 1952, p. 22-27.

Phase-boundary potentials of Ni in various aqueous solutions, practically free from Ni ions, were measured. The Ni solution potentials in air may drift and reach high positive potentials. The potentials of Ni vs. solution in an inert gas reach stationary values after several hours, depending upon the pH. The final potentials remain negative with respect to the standard hydrogen electrode. The role played by O_2 in influencing the potentials has an interesting bearing on the initial stages of corrosion of Ni. 12 ref. (R1, Ni)

56-R. Modern Automotive Engine Oils. *Lubrication,* v. 38, Jan. 1952, p. 1-12.

Increasing use of addition agents in lubricating oils. Advantages in prevention of contaminants or deposit-forming materials from interfering with engine operation, preventing rusting of ferrous parts and preventing corrosive wear. (R10, Q9, ST)

57-R. Cathodic Protection of Steel Underground. W. J. Schwerdtfeger and O. N. McCorman. *Technical News Bulletin* (National Bureau of Standards), v. 36, Jan. 1952, p. 1-2.

Previously abstracted from *Journal of Research of the National Bureau of Standards.* See item 380-R, 1951. (R10, ST)

58-R. Cathodic Protection of Tank Bottoms. *World Oil,* v. 134, Jan. 1952, p. 212-213.

Cathodic protection system is said to cost about 1½% of the replacement cost per year. Diagrams and illustrations show design of systems. (R10, ST)

59-R. The Rate of Solution and Solution Potentials of Iron. (In Russian.) Ia. V. Durdin and M. A. Oranskaia. *Zhurnal Obshchei Khimii,* v. 21 (83), Apr. 1951, p. 604-614.

Rate of solution and the solution potentials of Armco iron and commercial roofing iron in 10*N* HCl and H_2SO_4 were determined. Data are tabulated and charted. 11 ref. (R5, P13, Fe, CN)

60-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 44, Jan. 1952, p. 91A-92A, 94A.

Fifth of a series summarizing corrosion data in chart form. Concentrations and temperatures for corrosion of high Ni-Mo alloy by H_2SO_4. (R5, Ni, Mo)

61-R. Polyphosphate Detergents in Mechanical Dishwashing. Solubilizing Action of Polyphosphates on Certain Metals. Metallic Staining of Silverware. Leslie R. Bacon and Eugene G. Nutting, Jr. *Industrial and Engineering Chemistry,* v. 44, Jan. 1952, p. 146-155.

The ability of polyphosphates in commercial dishwashing detergents to dissolve Cu, Zn, and brass from dishwashing-machine parts has been responsible for serious operating difficulties. A brassy tarnish on silverware washed in certain machines has been traced to Cu dissolved from the machine. Laboratory corrosion data for many commercial detergent formulas. The difficulties may be overcome by elimination of cuprous metals or strongly electronegative metals such as Zn or Al from the dishwashing system. Highly silicated detergents minimize the problem. (R5, Ag, Cu, Ni, Fe, Zn, Al)

62-R. Tests on Lube Stability vs. Corrosion Show 1000-Mile Oil Change Is a Must. W. F. Weiland. *Petroleum Processing,* v. 7, Jan. 1952, p. 69, 71, 73, 74-75.

Results of tests on lube stability vs. corrosion of engine and bearing metals show that incipient corrosion is definitely related to an acid-vapor temperature of 215° F. or the temperature at which vapors with acid characteristics are liberated in progressive oil breakdown. (R7)

63-R. Graphite Ground Anodes Protect High-Pressure Gas Lines. A. W. Peabody. *Oil and Gas Journal,* v. 50, Jan. 28, 1952, p. 374, 376, 378, 380, 383-384, 386, 388-389.

The cathodic protection program undertaken by Rochester Gas & Electric Corp. against corrosion of a steel pipeline. (R10, ST)

64-R. Silicates in Detergents. E. A. Robinson. *Soap and Sanitary Chemicals,* v. 28, Jan. 1952, p. 34-36.

Use of silicates to inhibit corrosion of light metals, Cu-Zn, Cu-Ni alloys, and vitreous enamels by carbonates, ortho and polyphosphates. (R10, R7, Cu, Zn, Al, Ni)

65-R. Corrosion Problems Arising From Water in Chemical Industry. U. R. Evans. *Chemistry & Industry,* Dec. 31, 1951, p. 1193-1198; disc. p. 1198-1200.

Corrosion and inhibition. Deals mainly with coolers and boilers, al-

though other uses of water such as washing, rinsing, pressure transmission, seals for tanks, and fire extinguishing are mentioned. 53 ref. (R4)

66-R. Experimental Approach to the Problem of Tuberculation by Waters. R. S. Thornhill. *Chemistry & Industry,* Dec. 31, 1951, p. 1201-1205; disc. p. 1205-1207.

Results of research on corrosion of steel and cast iron by tuberculating water. (R4, ST, CI)

67-R. Corroded Nickel Buckles. H. H. Symonds. *Metal Industry,* v. 79, Dec. 28, 1951, p. 542.

Results of an investigation into the cause of visible rust stains on the elastic web of braces. Corrosion was due to the inadequate thickness of Ni on the buckle, particularly at the teeth. (R11, Ni, ST)

68-R. Report on Investigations Into the Stress-Corrosion Cracking in Welded Gas Mains. *Institution of Gas Engineers* (London), Communication 398, 1951, 31 pages.

Cracks are intercrystalline and typical of other examples of stress-corrosion cracking; they are associated with the welds, and cracking invariably starts from the inside of a main. The cracks are frequently associated with irregularities in the weld bead. A hot nitrate-solution test seemed to be satisfactory for determining relative susceptibility of steels to this form of cracking. Micrographs. (R1, K9. ST)

69-R. Corrosion of Axle Shafts and Propeller Screws of Ships. (In French.) *Circulaire d'Informations Techniques,* v. 8, Dec. 1951, p. 1415-1419.

Corrosion as observed on the "Rex" and the "Normandie"; causes and remedies. Materials include cast irons, carbon and alloy steels, manganese bronzes. (R4, CI, CN, AY, Cu)

70-R. Copper Corrosion of a Circulating Evaporator. (In German.) L. W. Haase. *Metalloberfläche,* ser. A, v. 5, Nov. 1951, p. A170-A171.

Probable reasons for the corrosion. Suggests that addition of sulfurous acid or sulfides in order to eliminate oxygen content of water is the main reason. (R4, Cu)

71-R. Corrosion and Its Control in a Chemical Plant. Clyde W. Dav. *Chemical Engineering,* v. 59, Jan. 1952, p. 154-157.

What is being done by the Celanese Corp. at Bishop, Tex. Types of corrosion encountered. (R29)

72-R. National Bureau of Standards Determines Optimum for Cathodic Protection. *Gas Age,* v. 109, Jan. 31, 1952, p. 25, 59-60.

Results of recent study on inhibiting underground corrosion of steel. (R10, ST)

73-R. Cathodic Protection of Underground Piping. *Heating Piping & Air Conditioning,* v. 24, Feb. 1952, p. 96-97.

See abstract of "Potential and Current Requirements for the Cathodic Protection of Steel in Soils". W. J. Schwerdtfeger and O. N. McCorman, *Journal of Research of the National Bureau of Standards.*

See item 380-R, 1951. (R10, ST)

74-R. Hermetic Welding Stops Internal Corrosion. Bernard Gross. *Iron Age,* v. 169, Feb. 7, 1952, p. 142-144.

Process for tubular aircraft structures such as engine mounts. Corrosion prevention is due to the fact that internal surfaces are hermetically sealed against the atmosphere. Methods of testing the welds for corrosion, flaws and complete sealing. (R11, S13, K general)

75-R. The Oxidation of Calcium at Elevated Temperatures. Daniel Cubicciotti. *Journal of the American Chemical Society,* v. 74, Jan. 20, 1952, p. 557-558.

Experimental results are charted and discussed. (R2, Ca)

76-R. Comparison of Corrosion Properties of Zirconium, Titanium, Tantalum, Stellite No. 6 and Type 316 Stainless Steel. *Material & Methods,* v. 35, Jan. 1952, p. 115, 117.

21 references.

(R general, Zr, Ti, Ta, SS, Co, SG-g, h)

77-R. From a Metallurgist's Notebook: Stained Aluminium Kettles. H. H. Symonds. *Metal Industry,* v. 80, Jan. 4, 1952, p. 5-6.

Results of an investigation to determine the cause and remedy of brown stains on Al kettles shipped to Australia and India. Cause was found to be certain conditions of temperature and humidity and not the wrapping. (R3, Al)

78-R. Corrosion. J. C. Rintelen, Jr. *New Mexico Miner,* v. 13, Dec. 1951, p. 5, 14, 17.

Thermodynamic, electrochemical and physical metallurgy standpoint. Variables effecting corrosion rate in various materials. (R1)

79-R. Oriented Chemical Overgrowths and Surface Topography. D. W. Pashley. *Proceedings of the Royal Society,* ser. A, v. 210, Jan. 7, 1952, p. 354-376.

Results of a study of the growth of thin halide tarnish layers on silver crystals. The substrate surfaces were prepared in various ways, so that their topography could be varied. By careful analysis of electron-diffraction patterns from the specimens, it was possible to deduce the true contact planes between Ag and halide for many of the observed orientations of silver halide. 10 ref. (R2, M26, Ag)

80-R. X-Ray Study of the Action of Oleic Acid on Lead. (In French.) J. J. Trillat and S. Barbezat. *Journal des Recherches du Centre National de la Recherche Scientifique,* no. 16, 1951, p. 18-20.

Influence of temperature, as well as other factors. X-ray diagrams. (R11, Pb)

81-R. Decomposition of Oxide Films on Metal Surfaces in Acid Vapors and Mechanism of Atmospheric Corrosion. (In German.) W. Feitknecht. *Chimia,* v. 6, no. 1, Jan. 15, 1952, p. 3-13.

Experimental studies show that corrosion is caused by impurities in the air, that corrosion occurs rapidly only above a humidity of about 70%, that Cu is protected by the products of corrosion, and that the product of corrosion of Fe is a hydroxide, while the other metals form normal and basic sulfates or a mixture of sulfate and H_2SO_4. Tables, graphs, and electron micrographs. 34 ref. (R3)

82-R. Chemical and Thermodynamic Principles of the Corrosion of Metals in Aqueous Solution. II. Corrosion of Cadmium in Sodium Chloride Solution. (In German.) W. Feitknecht and E. Wyler. *Helvetica Chimica Acta,* v. 34, Dec. 1, 1951, p. 2269-2278.

Shows that metallic corrosion is the result of the electrochemical properties of the metal, of the chemical and thermodynamic properties of the products of corrosion, and of changes in concentration of ions in the solution, especially, on the surface of the metal. Data are graphed and tabulated. 14 ref. (R5, Cd)

83-R. Corrosion by Micro-Organisms. (In German.) H. O. Nicolaus. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, Jan. 11, 1952, p. 39.

The chemistry of biologically caused corrosion and some effective means of combating it. (R1)

84-R. Electrolytic Activation of Passive Iron in Nitric Acid. (In German.) Klaus J. Vetter. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie,* v. 55, Dec. 1951, p. 675-683.

Experimental procedure and results. Dissolved iron was micro-analytically determined and the function of concentration of HNO_3 was theoretically computed. Diagrams and graphs. 24 ref. (R10, Fe)

85-R. The Question of Corrosion Fatigue. (In Russian.) G. V. Karpenko. *Doklady Akademii Nauk SSSR,* new ser., v. 79, July 11, 1951, p. 287-288.

Rotating-beam fatigue tests were made on steel specimens under various conditions of corrosion. Charted data and typical results. (R1, ST)

86-R. Mechanism of the Protection of Iron Apparatus From Corrosion With the Aid of Inhibitors and Protective Agents. (In Russian.) I. L. Rozenfel'd. *Doklady Akademii Nauk SSSR,* new ser., v. 79, July 21, 1951, p. 471-474.

The corrosion of iron structures in various electrolytes and under various protective conditions was studied. Results are charted. (R10, Fe, ST)

87-R. Progress in the Prevention of Corrosion. W. H. J. Vernon. *Australasian Engineer,* Dec. 7, 1951, p. 73.

See abstract from *Metal Progress;* item 48-R, 1952. (R10, ST, CI)

88-R. Cathodic Protection in Refineries. *Chemical Age,* v. 66, Jan. 26, 1952, p. 165-167.

Two fundamental approaches are available—use of d.c. supplied from a power source and application of an expendable anode which is corroded in place of the metal to be protected. (R10)

89-R. Effectiveness of Cathodic Currents in Reducing Crevice Corrosion and Pitting of Several Materials in Sea Water. Thomas P. May and H. A. Humble. *Corrosion* (Technical Section), v. 8, Feb. 1952, p. 50-56.

Cathodic protection was successful with Ni, monel and Types 302 and 316 stainless steel in quiet sea water. Types 410 and 430 stainless steels cannot be completely protected by cathodic currents because of the development of hydrogen blisters at current densities below that required for complete protection. Micrographs. (R10, SS, Ni)

90-R. A Field Investigation of Cathodic Protection in Glass Lined and Galvanized Water Heaters. W. A. Deringer and F. W. Nelson. *Corrosion* (Technical Section), v. 8, Feb. 1952, p. 57-64; disc., p. 63-64.

Results show how Mg anodes behave in both of above types of water heaters under a variety of water and performance conditions. Data are tabulated. (R10, ST, Zn)

91-R. The Chemical Resistance of Phenolic and Furfuryl Alcohol Type Coatings. Raymond B. Seymour and Robert H. Steiner. *Corrosion* (Technical Section), v. 8, Feb. 1952, p. 65-68; disc., p. 68.

Spot tests on steel and tin-plate panels, quantitative resistance tests on unsupported films and long-term tests on immersed, coated plummets were run to determine the corrosion and solvent resistance of acid-catalyzed phenolic coatings and acid-catalyzed, polyfurfuryl alcohol coatings. Data are tabulated. (R11, L26, Sn, CN)

92-R. Some Aspects of Ship Bottom Corrosion. *Corrosion* (Technical Section), v. 8, Feb. 1952, p. 69-88.

A discussion on above paper by Paul Pfield, published in Jan. 1952 issue; see item 45-R, 1952. (R4, CN, AY)

93-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 44, Feb. 1952, p. 85A-86A, 88A.

Concentrations and temperatures for corrosion of high-Si iron (Duriron) by H_2SO_4. (R5, CI)

94-R. A Study of Rust Preventive Properties of Greases. R. J. Burger, B. Rubin, and E. M. Glass. *Lubrication Engineering,* v. 8, Feb. 1952, p. 21-23, 26-27, 46.

A laboratory procedure using ball bearings which showed good correlation with service results. The investigation included petroleum, diester, Ucon oil, and silicone greases. Several factors influencing the degree of corrosion resistance were investigated. Effect of rust inhibition. (R10)

95-R. A Critical Look at Salt Spray Tests. F. L. LaQue, *Materials & Methods,* v. 35, Feb. 1952, p. 77-81.

Although widely accepted as a means of measuring the resistance of materials and finishes to corrosive environment, salt-spray tests are still highly controversial and are considered unreliable and misleading by many engineers. 11 ref. (R11)

96-R. New Interleaving Paper for Aluminum Inhibits Water Stain. W. Y. Bleakley and C. C. Lacy. *Materials & Methods,* v. 35, Feb. 1952, p. 176, 178, 180.

Sodium chromate was found to be the most effective chemical compound for the prevention of water stains in stacks of flat Al sheets. (R10, Al)

97-R. Marine Attack. Clyde Williams. *Monthly Business Review,* v. 34, Feb. 1952, p. 10.

Recent research methods for determining extent of attack by marine organisms, and salt-water corrosion of metals and alloys, including processes devised for counter-attack. Protective measures under study include: introducing Cu into wood preservatives, anti-fouling point, corrosion resistant alloys, and dehumidification equipment. (R4)

98-R. How to Combat Heat-Exchanger Corrosion. A. R. Dyer. *Oil and Gas Journal,* v. 50, Feb. 4, 1952, p. 69, 84.

Improved methods of cathodic protection and the development of new alloys appear to be the trend in the struggle against corrosion. (R10, SG-g)

99-R. Some Corrosion Problems In Petroleum Refineries. John F. Mason, Jr. *Petroleum Engineer,* v. 24, Feb. 1952, p. C10, C13-C14, C16-C18.

An analysis of 15 problems encountered. Each specimen was examined for cracking, pitting, and other forms of local attack. Method of test was in accord with ASTM Recommended Practice for Conducting Plant Corrosion Tests. Metals involved include Ni, stainless, carbon steel, cast iron, Cu, and alloy steels. (R11, R7, Ni, SS, CN, CI, Cu, AY)

100-R. Corrosion Resistance of Copper-Nickel-Chromium Plated Zinc, Aluminum and Magnesium-Base Die Castings. M. R. Caldwell, L. B. Sperry, L. M. Morse, and H. K. Delong. *Plating,* v. 39, Feb. 1952, p. 142-148, 159-163.

Tests to determine how chromium plated Zn, Al, and Mg-alloy die castings compare as to rate and type of corrosion when exposed to different outside atmospheres; how much plate is required to furnish adequate protection for each; how different alloys of Al compare with each other, and how Watts Ni compares with bright Ni under those conditions. Micrographs. Data are graphed and tabulated. (R3, L17, Ni, Zn, Al, Mg, Cr)

101-R. (Book) Report of the Chemistry Research Board With the Report of the Director of the Chemical Research Laboratory for the Year 1950. 104 pages, 1951. Dept. of Scientific and Industrial Research. His Majesty's Stationery Office, London, England.

The main lines of research in progress include corrosion of metals; high polymers and plastics; new techniques; less common elements including radioactive metals; and purification of organic compounds, particularly those derived from tar and those containing heavy carbon. The laboratory maintains close contact with academic chemistry, the various industries concerned, and with other government organizations with common interests. (R general, A9)

102-R. British Study Corrosion of Steel, Iron Pipe. *Iron Age,* v. 169, Feb. 21, 1952, p. 97.

Stresses cathodic protection. Tabular data give results of tests on steel and cast-iron pipe in various soils. (R8, R10, ST, CI)

103-R. Corrosion by Retained Treatment Chemicals on Phosphated Steel Surfaces. S. G. Clarke and E. E. Longhurst. *Journal of the Iron and Steel Institute,* v. 170, Jan. 1952, p. 15-18.

Results of humid-atmosphere corrosion tests. A simple performance test is suggested as a guide if the corrosive tendency of a phosphating

solution is not known, or if the geometry of the parts treated makes effective washing difficult. (R6, L14, ST)

104-R. How Six Plants Cut Corrosion Rates By 95%. William C. Uhl. *Petroleum Processing,* v. 7, Feb. 1952, p. 190-197.

The relatively high molecular weight, semipolar inhibitors employed are believed to function by their adsorption on metal surfaces to form well-organized films, one molecule in thickness. Tables, graphs, and diagrams. (R10)

105-R. Cathodic Protection of Steel Underground. *Water & Sewage Works,* v. 99, Feb. 1952, p. 83. (From "Potential and Current Requirements for the Cathodic Protection of Steel in Soils," W. J. Schwerdtfeger and O. N. McDorman.)

Previously abstracted from *Journal of Research of the National Bureau of Standards.* See item 380-R, 1951. (R10, ST)

106-R. Prevention of Damage Due to Brine Drippings on Track and Structures. W. E. Cornell, chairman. *American Railway Engineering Association Bulletin,* v. 53, Feb. 1952, p. 779.

An investigation of nontoxic additives for prevention of corrosion due to brine drippings. (R5, CN)

107-R. New Way to Detect and Locate Corrosion. J. B. McAndrew, W. H. Colner, and H. T. Francis. *Chemical Engineering,* v. 59, Feb. 1952, p. 305-308.

See abstract of "Rotogenerative Detection of Corrosion Currents", National Advisory Committee for Aeronautics, Technical Note 2523; item 2-R, 1952. (R11)

108-R. Electrochemical Studies of Anaerobic Corrosion in Presence of Sulphate-Reducing Bacteria. F. Wormwell and T. W. Farrer. *Chemistry & Industry,* Feb. 2, 1952, p. 108-109.

Electrode potential measurements on mild steel specimens were made in media inoculated with *Desulfovibrio desulfuricans* and a sterile control. (R11, R1, CN)

109-R. Scale in Turbine Blading; Its Cause, Its Influence on Performance and Its Prevention. R. T. Rolfe. *Iron & Steel,* v. 25, Feb. 1952, p. 53-55. (Reprinted from *Allen Engineering Review).*

Scale deposits were found to be composed substantially of boiler salts carried over in the steam. Data are tabulated. (R4, ST)

110-R. The Reaction Between Uranium and Oxygen. Daniel Cubicciotti. *Journal of the American Chemical Society,* v. 74, Feb. 20, 1952, p. 1079-1081.

Uranium was found to oxidize according to a parabolic law at low temperatures and according to a linear law at higher temperatures. (R2. U)

111-R. Hydrogen Evolution From the Tin-Iron Couple in Alkaline Solution. S. C. Britton. *Journal of Applied Chemistry,* v. 1, Suppl. Issue 2, 1951, p. S132-S136.

Corrosion of Sn in strongly alkaline solutions may be accelerated by contact with iron and may proceed even in the absence of O_2, H_2 being evolved from the iron. The degree of accleration depends on the area of exposed iron. During the cleaning of tinned ware in alkaline solution, contact of the work with a bare steel tank should be avoided, to reduce corrosion of the Sn. (R5, L12, Sn, Fe)

112-R. Corrosion of Welded 18/8 Type Chromium-Nickel Steels in Concentrated Nitric Acid. H. T. Shirley. *Journal of the Iron and Steel Institute,* v. 170, Feb. 1952, p. 111-118.

A study of attack by concentrated HNO_3 on Ti-stabilized Cr-Ni steels. The mechanism is essentially an extension of intercrystalline corrosion from boundary Cr impoverishment. Data are tabulated. Photomicrographs. (R6, SS)

113-R. Discussion on the Paper—"Protection of Structural Steelwork Against Atmospheric Corrosion," J. C. Hudson. *Journal of the Iron and Steel Institute,* v. 170, Feb. 1952, p. 153-156.

Covers the paper published in June 1951 issue. See item 292-R, 1951. (R3, ST)

114-R. The Corrosion Resistance of Some "Minor" Metals; A Review of the Available Information. *Metal Industry,* v. 80, Feb. 1, 1952, p. 83-85; Feb. 8, 1952, p. 111-113.

First part: Ti and Ti-Cr alloys. Second installment: Cb, Zr, Mo, Ta, and Ta-Mo alloys. 12 ref. (R general, Ti, Cr, Cb, Zr, Mo, Ta, EG-b)

115-R. The Salt-Spray Test. *Metal Industry,* v. 80, Feb. 15, 1952, p. 123-126.

History, methods, types of apparatus, and uses. (R11)

116-R. Corrosion of Magnesium Alloy ZK60A in Marine Atmosphere and Tidewater. Fred M. Reinhart. *National Advisory Committee for Aeronautics,* Technical Note 2632, Feb. 1952, 10 pages.

Investigation showed that the unprotected alloy was so rapidly attacked in tidewater that it would be of no practical value in applications subject to sea-water exposure. In a marine atmosphere, rate of corrosion was much less. Here, the al-

loy should give good service if adequately protected. Data are tabulated. Micrographs. (R3, R4, Mg)

117-R. Corrosion Problems: 1952. H. O. Teeple. *Paper Trade Journal*, v. 134, Feb. 22, 1952, p. 127-128.

Various approaches to the solution of corrosion problem in pulp and paper mills. (R general)

118-R. Metallic Corrosion. W. H. J. Vernon. *Research*, v. 5, Feb. 1952, p. 54-61.

Principles are broadly surveyed with special reference to the controlling factors in immersed, underground, and atmospheric corrosion and their application to the prevention of corrosion under service conditions. 26 ref. (R general)

119-R. Corrosion-Resistant Mist Prevents Rust. *Steel*, v. 130, Feb. 25, 1952, p. 83.

How Wheeling Steel Corp. utilizes VPI, a volatile corrosion inhibitor marketed by the Shell Oil Co. (R10, ST)

120-R. "Immunization" of Metallic Surfaces Against the Action of Corrosive Agents. (In French.) Jean Loiseleur. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Jan. 7, 1952, p. 260-262.

Formation of a monomolecular layer of Cassius purple on a polished Ag or Cu plate. This imparts to the plate a remarkable resistance to oxidation and reaction with sulphur. Application to other metals and mechanism of the protective action. "Immunization" is defended as a suitable term for the particular type of protection. (R10, Ag, Cu)

121-R. The War Against Rust; the Introduction of Inhibitors. *Australasian Engineer*, Jan. 7, 1952, p. 92-93.

Plastic, fluid, thin film, and solvent types of petroleum-base rust preventives. (R10)

122-R. Protects Aluminum. *Aviation Week*, v. 56, Mar. 3, 1952, p. 51.

A new specially treated tissue paper which prevents water staining of stacked Al sheets, developed by Kaiser Aluminium and Chemical Corp. (R10, Al)

123-R. Corrosion Problems in Processing. U. R. Evans. *Canadian Chemical Processing*, v. 36, Feb. 1952, p. 38, 40-41.

The main types of corrosion encountered in chemical industry, in connection with water cooling systems. (R4)

124-R. Hydrogen Sulphide Corrosion Cracking of Steel. L. W. Vollmer. *Canadian Mining and Metallurgical Bulletin*, v. 45, Feb. 1952, p. 103-109; *Transactions of the Canadian Institute of Mining and Metallurgy*, v. 55, 1952, p. 89-95.

Results of an investigation. The failures of 9% Ni steel tubing were initiated by stress-corrosion cracking. Data are tabulated. Micrographs. (R1, AY)

125-R. Cathodic Protection of Moving Underwater Equipment. William S. Merrithew. *Corrosion* (Technical Section), v. 8, Mar. 1952, p. 90-92.

Successful operation of a cathodic protection system to safeguard moving underwater equipment at the water softening and filtration plant of the Metropolitan Water District, Southern California. Mg anodes are used. (R10, ST, Mg)

126-R. Chemical Treatment to Mitigate Corrosion. J. G. Jewell. *Corrosion* (Technical Section), v. 8, Mar. 1952, p. 100-108.

A review of surface-active and ionic-type corrosion inhibitors, methods of neutralization and buffering, removal of corrosive agents, self-repairing coatings, and bactericides. Anodic and cathodic agents, and the various factors incident to the use of these types of inhibitors. Organic inhibitors, adsorption inhibitors, pickling inhibitors, oil-wetting agents, and special applications of anticorrosion additives. 39 ref. (R10)

127-R. Some Effects of Cathodic Protection on Conventional Paints. L. P. Sudrabin, F. J. LeFebvre, D. L. Hawke, and A. J. Eickhoff. *Corrosion* (Technical Section), v. 8, Mar. 1952, p. 109-114.

Four groups of tests were set up in fresh and in salt water to determine suitability of various combinations of paint coatings and cathodic protection for steel structures immersed in water or buried in soil. Results are tabulated. (R10, CN)

128-R. Low-Energy Measurement Problems in Cathodic Portection. H. N. Hayward and R. M. Wainwright. *Electrical Engineering*, v. 71, Mar. 1952, p. 276-278. (To be published in *AIEE Transactions*, v. 71, 1952.)

Some elementary methods of obtaining metal-to-soil potential measurements are analyzed for the purpose of developing rugged yet sufficiently accurate field measuring equipment. These potentials often must be known for cathodic-protection work. (R11, R10)

129-R. Causes and Prevention of Corrosion. Arthur Marsden. *Gas Journal*, v. 269, Feb. 13, 1952, p. 413-414, 419-420, 425; disc., p. 425-426, 429.

Contact of dissimilar metals; nonuniformity of the metal, whether due to impurities or to segregation; presence of oxygen in the surround-

ing medium; internal stresses in metals; stray electric currents, which often assist in the destruction of gas and water mains; and elevated temperatures. Various forms of protection. (R general)

130-R. How You Can Avoid Boiler Tube Corrosion. H. F. Hinst. *Heating, Piping & Air Conditioning,* v. 24, Mar. 1952, p. 77-83.

An analysis and discussion of the types and causes of corrosion of steel boiler tubes. Seven general rules for avoiding serious tube corrosion problems. (R4, ST)

131-R. Semi-Accelerated Corrosion Tests of Medium and High Tensile Steel in Contact with Phenolic Foam. H. J. Start, J. Kaminetsky, and R. R. Winans. *Journal of American Society of Naval Engineers,* v. 64, Feb. 1952, p. 49-57.

Action of three types of phenolic foam and of balsa wood with respect to corrosion of steel and relationships between the pH measurements on water extracts of crushed samples and the observed corrosive effects. Micrographs. Data are tabulated. (R11, R7, CN, AY)

132-R. The Distinguishing Characteristics of Boiler Tube Failures. Frank E. Clarke. *Journal of American Society of Naval Engineers,* v. 64, Feb. 1952, p. 83-94.

"Cavities" and "scars" are defined as pits, grooves, gouges, and wasted areas which have resulted in obvious internal or external loss of tube metal, without evidence of abnormal temperatures. They include generalized corrosion, steam gouging, and mechanical scars. "Cracks and fissures" category includes all failures which occur as narrow slits or crevices without significant deformation of tube shape or loss of metal. The various types are illustrated. (R1, Q26, ST)

133-R. The Chemistry of Marine Corrosion. Carvel Hall Blair. *Journal of American Society of Naval Engineers,* v. 64, Feb. 1952, p. 121-126.

The theory of corrosion of metals and how a knowledge of this theory can be put to practical use. (R1, R4)

134-R. Cathodic Protection Checks Water Ills. Sheppard T. Powell. *Power,* v. 96, Mar. 1952, p. 71-73, 202, 204, 206, 208.

Analyzes the principle of cathodic protection of metals and evaluates methods, giving advantages and precautions. (R10)

135-R. The Oxidation of Metals in an Artificial Atmosphere. (In Dutch.) C. H. Luiten. *Smit Mededelingen,* v. 6, Oct.-Dec. 1951, p. 122-126.

Oxidation of metals in a controlled atmosphere will take place if the dissociation pressure of the metal-oxide is smaller than the O_2 pressure of the surrounding atmosphere. Also, in so-called O_2-free atmospheres, a certain amount of O_2 exists which may be calculated from the equilibrium data of the dissociation of CO_2 or H_2O. The O_2 pressure appears to depend on and to vary with the square of the CO_2-CO or H_2O-H_2 ratios. Therefore, in an atmosphere containing CO_2, CO, H_2O, and H_2, these ratios are not independent. Some practical conclusions. (R2)

136-R. Oxidation of Metallic Uranium. (In French.) Jean Loriers. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Jan. 2, 1952, p. 91-93.

Compares the oxidation mechanism of U with that of Ce above 140° C. Diagrams. (R2, U, Ce)

137-R. Protection Against Corrosion and Use of Low-Alloy Steels. (In French.) D. Bermane. *L'Ossature Métallique,* v. 17. Jan. 1952, p. 42-48.

Results of atmospheric tests on uncoated and paint-coated steels of various compositions. Tables, diagrams, charts, and photographs. 15 ref. (R3, AY)

138-R. Micrographic Study of the Oxidation of Iron and of the Transformations of Iron Protoxide. (In French.) G. Chaudron and R. Collongues. *Revue de Métallurgie,* Dec. 1951, p. 917-922; disc., p. 922.

Study of formation of FeO on the surface of the metal; its decomposition into Fe_3O_4 and Fe. Laboratory method for preparation of the oxide layer; constitution and mode of formation of the oxide film; and decomposition of the protoxide. Photomicrographs. (R2, M27, Fe)

139-R. Effect of Wetting Agents on Corrosion Resistance. II. Effect of Non-Ionic Wetting Agents. (In German.) Luigi Piatti. *Werkstoffe und Korrosion,* v. 2, Dec. 1951, p. 441-444.

Nonionic wetting agents are shown to be more effective than ionic wetting agents in preventing the pitting effect of tap water and in removing tuberculation from steels. Tables and graphs show effect of type and concentration of wetting agent and of time of exposure. Photomicrographs. (R4, ST)

140-R. Chemical Reactions in Central Hot-Water Supply Systems. (In German.) Gunther Seelmeyer. *Werkstoffe und Korrosion,* v. 2, Dec. 1951, p. 448-456.

Years of experimentation reveal that the materials of hot-water systems continuously react with the

circulating water, and that the effect of chemical reactions depends not only on temperature but also on all other operating conditions. Methods of inhibiting formation of rust, sludge, and oxide scale. Data are tabulated. (R4)

141-R. Problems of Acceptance and Supervision of Chemical Apparatus With Respect to Materials of Construction. (In German.) Kurt Richard. *Werkstoffe und Korrosion,* v. 2, Dec. 1951, p. 457-461.

Reliability and safety require the testing of apparatus exposed to the effects of chemicals and heat, especially since these two factors frequently reduce strength and chemical resistance of initially satisfactory materials. Methods of testing. Materials of construction include carbon and various alloy steels. Micrographs and graphs. (R general, T29, CN, AY)

142-R. Chemical Problems in the High-Pressure Power Plant. (In German.) Kurt Wickert. *Werkstoffe und Korrosion,* v. 3, Jan. 1952, p. 17-29.

Numerous factors, including salt, CO_2, O_2, high-temperature corrosion, stress-corrosion, etc., to be considered in designing high-pressure power plants. Use of the Benson boiler. Diagrams, photographs, photomicrographs, graphs, and tables. (R4)

143-R. Behavior of Cr-Ni Steels in Sulfuric Acid. (In German.) *Werkstoffe und Korrosion,* v. 3, Jan. 1952, p. 31-34.

Brief factual discussion includes extensive tables and graphs. (R5, AY, SS)

144-R. Thermobalance Study of Oxidation of Metals. Copper-Tin Alloys. (In Italian.) F. De Carli and N. Collari. *Metallurgia Italiana,* v. 44, Jan. 1952, p. 1-5.

Study involved continuous photographic recording of weight changes. In the case of Cu-Sn alloys, a depression in the oxidation is evident for the α-phase, which becomes more and more pronounced as it approaches saturation of the primary solid solution. The γ-phase, on the other hand, is more readily oxidizable, whereas the ε-phase is practically nonoxidizable. Further developments of this method may prove to be of interest in the study of industrial heat resisting alloys. 30 ref. (R2, Cu, Sn)

145-R. Research on Salt-Spray Corrosion Tests; Characteristics of the Fog. (In Italian.) G. Bianchi and A. Mora. *Metallurgia Italiana,* v. 44, Jan. 1952, p. 9-13.

Experiments on the operation of the salt-spray chamber for corrosion tests were carried out by means of sedimentation tests, using a new solarized photographic-plate method. Dimensions of the fog particles were also determined. Apparatus is diagrammed; results are charted. (R11)

146-R. Corrosion of Metals by Hydrocarbon Solutions of Aliphatic Acids. (In Russian.) L. G. Gindin and V. A. Kazakova. *Doklady Akademii Nauk SSSR,* new ser., v. 80, Sept. 21, 1951, p. 389-392.

The corrosion of Mg, Fe and Pb by solutions of acetic, butyric, valeric, caproic, and lauric acids in benzene, isooctane, and petroleum ether was investigated. Data are tabulated and charted. 11 ref. (R5, Mg, Fe, Pb)

147-R. The Influence of the Solvent in Acid Solutions on Their Behavior Toward Metals. (In Russian.) L. G. Grindin, V. A. Kazakova, and I. N. Putilova. *Doklady Akademii Nauk SSSR,* new ser., v. 80, Oct. 11, 1951, p. 777-780.

A study was made of the corrosion of Fe and Cu by solutions of butyric acid in water, benzene, isooctane, and vaseline oil. Data are tabulated. 21 ref. (R5, Fe, Cu)

148-R. Lubricant Corrosion Is Being Licked. *Chemical and Engineering News,* v. 30, Mar. 17, 1952, p. 1098.

How MoS_2 can be used to prevent fretting corrosion of closely fitted machine parts. Design factors are considered as a means of eliminating crevice corrosion in engines. (R1)

149-R. The Use of Radioactive Tracers in the Study of the Mechanism of Action of Corrosion Inhibitors. D. M. Brasher and E. R. Stove. *Chemistry & Industry,* Feb. 23, 1952, p. 171-172.

Work primarily on the mechanism of the inhibitive action of sodium benzoate; but, in view of the excessive cost of sodium benzoate containing C^{14}, it was decided to develop the necessary microtechnique by preliminary work with radioactive K_2CrO_4. (R10, S19)

150-R. Alternate Immersion Corrosion Test Equipment; Improvements in Design. Chuk-Ching Ma. *Industrial and Engineering Chemistry,* v. 44, Mar. 1952, p. 583-585.

Characteristic features are the hanging of the specimen in a horizontal position to insure equal duration of immersion of all parts of the specimen, and the continuous up and down movement of the specimen. (R11)

151-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 44, Mar. 1952, p. 89A-90A, 92A.

Corrosion of stainless steels by H_2SO_4 as a function of temperature. A note on iron-blast-furnace slag. (R5, SS)

152-R. The Reaction of Cerium With Oxygen. Daniel Cubicciotti. *Journal of the American Chemical Society,* v. 74, Mar. 5, 1952, p. 1200-1201.

Oxidation of Ce was found to obey the parabolic law from 30 to 125° C. Above 125° C. the reaction started parabolically, but subsequently became linear. The parabolic portion became shorter as the temperature was increased. Ce is the most rapidly oxidizing metal yet studied. Energy of activation of the parabolic reaction is the smallest yet observed. (R2, Ce)

153-R. Corrosion History of a Domestic Hot Water System. John R. Baylis. *Journal, American Water Works Association,* v. 44, Mar. 1952, p. 224-238.

Analyzes the condition of a hot-water tank after 22½ years of use. The tank was galvanized iron, 30-gal. capacity, with metal thickness of 0.08 in. It was connected to a furnace heater and to a gas heater. (R4, Fe, Zn)

154-R. Corrosion. *Oil and Gas Journal,* v. 50 Mar. 17, 1952, p. 203-210, 212-213, 216, 220, 224.

Questions and answers on corrosion types—causes and prevention, cathodic protection, materials used to fight corrosion, applications—equipment, environment, and testing. 28 ref. (R general)

155-R. Engineering Inspection for Corrosion Control. F. A. Upson. *Oil and Gas Journal,* v. 50, Mar. 17, 1952, p. 227-228, 231-232.

A program which maintains a constant and accurate check on equipment service. An orderly system of records in turn provides valuable information for the prevention of accidents, development of corrective measures, and design of future operating units. (R11)

156-R. How to Combat Corrosion in Processing Oil and Gas. Marshall E. Parker. *Oil and Gas Journal,* v. 50, Mar. 17, 1952, p. 235-244.

Discusses each of the basic and special types of corrosion. Losses caused by corrosion; weapons against corrosion; corrodents in the refinery; detection and diagnosis of corrosion; designing against corrosion; corrosion-testing methods; and controlling unanticipated corrosion. (R general)

157-R. Low-Temperature Corrosion in a Crude-Distillation Tower. T. N. Griswold. *Oil and Gas Journal,* v. 50, Mar. 17, 1952, p. 247-248, 250, 255.

Causes, tests with steel, Monel, and cast iron; and control by desalting and NH_3 injection. (R7, ST, Ni, CI)

158-R. Applications of Cathodic Protection to Control Refinery Corrosion. V. W. Hatchett. *Oil and Gas Journal,* v. 50, Mar. 17, 1952, p. 256, 258-259, 261-262, 264.

The sacrificial-anode procedure and induced-current method; case histories for each. Includes economics of cathodic protection. (R10)

159-R. Cities Service Tackles Brackish-Cooling-Water Corrosion. J. J. Picarazzi. *Oil and Gas Journal,* v. 50, Mar. 17, 1952, p. 271-272, 274, 276, 279-280, 282.

Methods used for combating the problem. Screening, analysis, and intermittent chlorination of water; use of special tube materials and coatings. Materials included Al brass ferrules in Admiralty metal tubing; 70-30 Cu-Ni tube sections; and Alclad tubes. Internal appearance of used tubes. (R4, Cu, Al)

160-R. How Gulf Oil Corp. Reduces Furnace Tube-End Corrosion. F. C. Braun. *Oil and Gas Journal,* v. 50, Mar. 17, 1952, p. 285-286, 288-289.

Excessive deterioration in the rolled ends of carbon or low-alloy steel tubes is related to stresses set up during expansion, distortion of metal structure, and erosion caused by turbulence at the internal offset formed by the expander during the rolling operation. Other remedial methods evaluated are safe ending, high-alloy end liners, and inside-upset tube ends. (R7, CN, AY)

161-R. How to Control Internal Corrosion of Crude Still Condensers. Marion J. Wilcox and Franklin M. Watkins. *Oil and Gas Journal,* v. 50, Mar. 17, 1952, p. 290-293.

Use of organic inhibitors. (R7, R10)

162-R. Preliminary Report on Effect of Spillage on Hot-Applied Coal-Tar Coatings. Carl Miller. *Oil and Gas Journal,* v. 50, Mar. 17, 1952, p. 294-295.

Spillage of petroleum products has little effect on narrow-range enamels; wide-range enamels are not satisfactory. The effect of gasoline, kerosine, and fuel oil on hot-applied coal-tar enamels used for protection against corrosion. (R7, L26)

163-R. Salt-Water Corrosion in Refinery Cooling Equipment. Byron M. Beildeck and O. F. Noss, Jr. *Oil and Gas Journal,* v. 50, Mar. 17, 1952, p. 296, 299-300, 302, 304.

Investigation to determine magnitude and causes of the increase in corrosion and to study the salt-water system in as many phases as necessary to determine what changes should be made to improve the situation. (R4)

164-R. Magnolia Reduces Furnace Corrosion in Polyformer. J. J. Baker. *Oil and Gas Journal,* v. 50, Mar. 17, 1952, p. 306, 309, 316.

Corrosion was reduced by installation of higher alloy steel. Graphs and tabulated data. (R7, AY)

165-R. Production-Proved Inhibitor Gets Results in Refineries and Natural-Gasoline Plants. Forrest E. Love. *Oil and Gas Journal,* v. 50, Mar. 17, 1952, p. 310-312.

An organic corrosion inhibitor used in refineries to afford protection in practically every kind of refining process and against most types of corrosion encountered by refiners is called Kontrol, manufactured by Tretolite Co. A possible exception is high-temperature, furnace-tube corrosion. Brief summary of different installations where the material is in service. (R10)

166-R. Case Histories of Corrosion Problems and Use of Protective Coatings in Their Solution. 1. Interior Tank Corrosion. W. B. Cook. *Oil and Gas Journal,* v. 50, Mar. 17, 1952, p. 313-316.

Various instances encountered at Gulf Oil Corp.'s Port Arthur refinery. (R7, L general)

167-R. Cathodic Protection of Pipe Underground. *Petroleum Engineer,* v. 24, Mar. 1952, p. D46, D48.

See abstract of "Potential and Current Requirements for the Cathodic Protection of Steel in Soils", W. J. Schwerdtfeger and O. N. Dorman, *Journal of Research of the National Bureau of Standards;* item 380-R, 1951. (R10, ST)

168-R. Is Corrosion Resistance Your Problem? Aluminum Die Castings Give Good Service in the Presence of Soap and Detergents. *Precision Metal Molding,* v. 10, Mar. 1952, p. 38, 81-83.

(R7, T29, Al)

169-R. Black Spots on Brass. (In French and German.) Paul Ducommun. *Pro-Metal,* v. 4, Dec. 1951, p. 925-927.

Proposes an explanation of this phenomenon. Because of differential aeration, corrosion results from the formation of small galvanic concentration cells in wet spots between brass plates. Experiments verifying the theoretical explanation. (R1, Cu)

170-R. Staining of Copper Alloys After Pickling in Sulphuric Acid. A. L. Simmons. *Australian Journal of Applied Science,* v. 2, Dec. 1951, p. 464-472.

Investigation carried out with Cu-Zn alloys and nickel silvers shows that acid carried over into the rinse water after pickling is a major cause of staining during subsequent storage. (R5, Cu, Zn)

171-R. Dissolving Velocity of Metals in Deutero-Electrolytes. (In English.) J. Brun. *Acta Chemica Scandinavica,* v. 5, Nos. 9-10, 1951, p. 1402-1404.

Experiments dealing with the dissolution of Zn, Al, and Fe in acids and bases, the hydrogen content of which has been partly or completely replaced by deuterium. Data are tabulated. (R5, Zn, Al, Fe)

172-R. Corrosion Inhibitors and Promoters in Liquid Media. (In French.) L. Cavallaro and A. Indelli. *Revue de Métallurgie,* v. 49, Feb. 1952, p. 117-124.

Results of studies of the action of chromates and nitrates on carbon steel in a neutral medium and on stainless steel in an acid medium; corrosion of a carbon steel—stainless steel couple; effect of sulfurous anhydride; and rate of corrosion. Tables and graphs. 26 ref. (R10, CN, SS)

173-R. The Corrosion of Cadmium and Zinc Coatings. (In German.) G. Schikorr. *Metalloberfläche,* ser. A, v. 5, Dec. 1951, p. A177-A185.

Comparative quantitative experiments. Results are tabulated and charted. 22 ref. (R11, Cd. Zn)

174-R. Short-Time Testing of Electrolytic Chromium-Nickel Coatings for Corrosion Resistance. (In German.) Hermann Hefele. *Metalloberfläche,* serv. B, v. 4, Feb. 1952, p. B17-B24.

Compares atmospheric corrosion with results of various accelerated corrosion tests. Porosity tests, and causes of corrosion-increasing pores, blisters, and cracks in Cr-Ni electrodeposits. Photomicrographs, tables, diagrams, and graphs. 21 ref. (R11, L17, Cr, Ni)

175-R. Coating of Freshly Passivated Iron and Its Relationship to Refractory Properties. (In German.) Klaus J. Vetter and Hans-Jurgen Booss. *Zeitschrift für Elektrochemie Berichte der Bunsengesellschaft für Physikalische Chemie,* v. 56, Jan. 1952, p. 16-19.

The black coating formed during the passivation of iron with HNO_3 increases in thickness and blackness with carbon content. Experiments showed the coating to be Fe_3C and that refractoriness decreases be-

cause of the reducing action of this carbide. Data are tabulated and graphed. (R10, Fe)

176-R. The Influence of Ammonium Salts on the Corrosion of Powdered Copper. (In Russian.) A. V. Pomosov, T. N. Rogatkina, and A. I. Levin. *Zhurnal Prikladnoi Khimii,* v. 24, July 1951, p. 720-722.

Experimental study shows that the volatility of the acid forming the anion of the salt is the basic factor determining the corrosion activity of the salt. Data are tabulated. (R6, Cu)

177-R. The Problem of Atmospheric Corrosion of Copper Powder. (In Russian.) A. V. Pomosov and A. I. Levin. *Zhurnal Prikladnoi Khimii,* v. 24, July 1951, p. 723-726.

The corrosion of Cu powder by dry and moist vapors (H_2S, SO_2, CO_2, HCl and NH_3) was investigated. Data are tabulated. (R3, Cu)

178-R. Is Cathodic Protection Justified on Lines With Superior Coating? Marshall E. Parker. *American Gas Journal,* v. 176, Mar. 1952, p. 14-15, 42.

Refers to underground pipelines. Corrosion engineers answer above question in the affirmative, even if the soil traversed is only mildly corrosive. (R10, CN)

179-R. Preventing Intergranular Corrosion Due to Welding Stainless. Stanley C. Orr. *Chemical Engineering,* v. 286, 288, 290, 292-294, 296.

Merits of the three principal ways and reasons why heat treatment is often better than the use of stabilized and extra-low-carbon stainless steels. Diversion of Cb—formerly available as a stabilizing agent—to high-strength and heat-resistant alloys is only one factor favoring the heat treatment method. (R10, J23, SS)

180-R. The Electrical Nature of Corrosion and Cathodic Protection. H. D. Holler. *Electrical Engineering,* v. 71, Apr. 1952, p. 367-373.

This study of corrosion from the electrical standpoint is an evaluation of the behavior of galvanic couples in accordance with the laws of electricity. 16 ref. (R1, R10)

181-R. Corrosion Resistance of Alloys at High Temperatures Studied at Inco Laboratories. *Industrial Heating,* v. 19, Mar. 1952, p. 450.

Research program and procedures. (R11, SG-h)

182-R. A Spectrophotometric Study of the Oxidation of Tantalum. J. T. Waber, G. E. Sturdy, E. M. Wise, and C. R. Tipton, Jr. *Journal of the Electrochemical Society,* v. 99, Mar. 1952, p. 121-129.

See abstract from *U. S. Atomic Energy Commission,* AEC-1355; item 384-R, 1951. (R2, Ta)

183-R. Corrosion Resistance of the Weld Zone in Stainless Steels. (In Japanese.) Tetsutaro Mitsuhashi, Yutaka Imai, Manabu Ueno, and Toshiaki Hagiwara. *Journal of Mechanical Laboratory,* v. 5, Oct. 1951, p. 262-268.

Data are tabulated and charted for various chemical solutions and stainless steel compositions encountered in the Japanese textile industry. Results are summarized in English. (R5, SS)

184-R. Experts Voice Opinions in Agreement and Rebuttal on "A Critical Look at Salt Spray Tests." *Materials & Methods,* v. 35, Mar. 1952, p. 77-81, 156, 158, 160, 162, 164, 166, 168.

Comments on Frank LaQue's article (in last month's issue; item 95-R) differ widely, but most users and specifiers agree that there is room for improvement in the tests and their application. (R11)

185-R. Liquid Sodium—a Noncorrosive Coolant. R. F. Koenig and S. R. Vandenberg. *Metal Progress,* v. 61, Mar. 1952, p. 71-75.

The corrosive properties of liquid Na in contact with several stainless steels and high-Ni alloys; several test methods. The most fundamental approach employs solubility studies. Small containers of the material being tested are filled with Na, and samples of the Na are removed after suitable periods of heating. Chemical analysis of the samples provides solubility data. From this and metallographic examination of the containers, an indication of rate, extent, and manner of attack was obtained. Other methods, including those revealing effect on mechanical properties. (R6, P13, SS, Ni)

186-R. Trends in Corrosion Control. Herbert H. Uhlig. *Metal Progress,* v. 61, Mar. 1952, p. 82-88.

Reviews corrosion since 1900. Superstition and science; evaluating corrosion rate of metals and alloys; paints; metallic and nonmetallic coatings; cathodic protection, and role of the corrosion engineer. (R general)

187-R. Corrosion in Monoethanolamine Solutions. Marshall E. Parker. *Oil and Gas Journal,* v. 50, Mar. 31, 1952, p. 122.

Development of the amine process for removal of acid gases from natural and refinery gas, together

with the later combination amine-glycol process for simultaneous removal of water, brought in its wake a set of corrosion problems. Modification of process conditions, and the use of Al 3S alloy, Al 3S Alclad, and 4-6 Cr, 1/2 Mo steel have proved to be satisfactory for preserving tubes in this service. (R7, AY, Al)

188-R. Study on the Anodic Passivation of Lead, Part I. Effect of Cl^- and Co^{++} Ions on the Passivation of Lead in Zinc Sulfate Solution. (In Polish.) M. Smialowski and E. Przybyla. *Prace Glownego Instytutu Metalurgii,* v. 3, no. 6, 1951, p. 501-505.

The change of lead anode potential with time was studied experimentally at various current densities, using a Curie electrometer and a photographic recorder. Typical potential-time curves obtained under "normal" experimental conditions. Results obtained with pure Pb anodes and with Pb anodes containing 1% Ag are compared. (R10, Pb)

189-R. Protection of Metallic Structures From Corrosion in Soil by the Use of Protectors. (In Russian.) A. F. Lunev and G. V. Akimov. *Izvestiia Akademii Nauk SSSR,* Section of Chemical Sciences, July-Aug. 1951, p. 361-369.

Experiments were made to evaluate the cathodic protection action of Mg, a Mg-Zn-Al alloy, an Al-Zn alloy, and Zn on iron structures exposed to underground corrosion. Cylindrical casings of Mg or the Mg alloy were found to be superior. Filling the casings with $CaSO_4$, $CaSO_4$ + $MgSO_4$ and similar compounds added to the protective action. Results are tabulated and charted. (R10, Fe, ST)

190-R. Performance of Magnesium Galvanic Anodes in Underground Service. Oliver Osborn and H. A. Robinson. *Corrosion* (Technical Section), v. 8, Apr. 1952, p. 114-129; disc., p. 129.

Reviewed in the light of past 5 years of field testing in which 2500 anodes have been tested in some 40 different backfills and in various soils. Pertinent indices of galvanic-anode performance: various factors influencing the performance of Mg anodes. (R10, Mg, ST)

191-R. Radiant Heating Systems Need Cathodic Protection Too. J. F. Hirshfeld and L. P. Schaefer. *Corrosion (Technical Section),* v. 8, Apr. 1952, p. 140-142.

Cathodic-protection systems installed in two bus garages of the Detroit City Dept. of Street Railways to avoid replacement of a radiant heating system. The protection system consisted of graphite anode rods installed under the concrete floor connected to Se rectifiers of appropriate capacity. Pipes are steel or wrought iron. (R10, ST, Fe)

192-R. Physical Chemical Aspects of Corrosion Inhibition. Norman Hackerman. *Corrosion* (Technical Section), v. 8, Apr. 1952, p. 143-148; disc., p. 148-149.

Some of the basic physical and chemical phenomena which occur during inhibition of corrosion of metals by liquid environments. The way in which each of these may be involved and their relative importance in the overall process. Several recent researches in this field. 26 ref. (R10)

193-R. Corrosion Problems of the Railroads. L. S. Crane. *Corrosion* (Technical Section), v. 8, Apr. 1952, p. 149-151. (*Reprinted from Railroad Corrosion News Letter,* v. 1, Jan. 1952).

Major corrosion problems of railroads and remedies include bridge painting, brine-drippings damage, car painting, steam-boiler corrosion cracking, diesel engine corrosion difficulties with cylinder liners, bearing and injection systems, trackage losses from stress, humidity, and mechanical deficiencies. Work of the American Railway Engineering Association in redesign of rail-fillet area to give better stress distribution (R general, Q25, ST)

194-R. High Temperature Scale Resistance. Albert M. Portevin. *Metal Progress,* v. 61, Apr. 1952, p. 94-95.

Briefly reviews general principles for getting good chemical resistance at high temperatures in metals and alloys. Deals with refractories used in metallurgical processes to increase oxidation resistance. (R2)

195-R. "Whiskers" on Metal Surfaces. *Metal Progress,* v. 61, Apr. 1952, p. 172, 174. (Condensed from "Filamentary Growths on Metal Surfaces—Whiskers", K. G. Compton, A. Mendizza, and S. M. Arnold.)

Previously abstracted from *Corrosion.* See item 422-R, 1951. (R general)

196-R. Avoid Blade Corrosion and Erosion. W. H. Lloyd. *Power,* v. 96, Apr. 1952, p. 94-97, 206.

Inspection, correction, and restoration aspects of corroded blades for steam turbines. Material mainly used is 12%-Cr steel. (R general, SS)

197-R. Prevention of Corrosion of Ships in Sea Water by Means of Cathodic Protection. K. N. Barnard. *Research,* v. 5, Mar. 1952, p. 116-125.

General experience of the Naval Research Establishment, Halifax, Nova Scotia, with cathodic protection as a means of preventing the corrosion of shipping in sea water; some of the economical aspects of the use of such a system. Use of Mg anodes as a means of protection. (To be continued.) (R10, Cr)

198-R. Sweet Oil Well Corrosion. H. L. Bilhartz. *World Oil,* v. 134, Apr. 1952, p. 208, 210, 213-214, 216.

Problems of high-pressure and low-pressure sweet oil well corrosion from a standpoint of investigative approach, criteria, causative agents, and remedial measures. Preliminary findings of representatives of 30 companies. Includes use of plastic-coated tubing, nickel tubing, and galvanized or Ni-plated pipe. Diagrams and photographs. (R7, ST, Ni, Zn)

199-R. Metal-Plated Fabric Substitute for Wire Gauze: Laboratory Tests for Durability. "Textiles and Their Testing," His Majesty's Stationery Office (London), 1951, p. 41-44. (Based on R.A.E. Report by F. Millard and E. Whatham.)

A sample of metal-plated textile fabric proposed as a substitute for 200-mesh gauze in refueling funnels, as a separating medium for water, was tested for durability after cyclical immersion in sea water at room temperature, and accelerated aging in a moist atmosphere at 70° C. Ni and Cu were used. (R4, Ni, Cu)

200-R. Further Laboratory Durability Tests on Metal-Plated Fabric As a Substitute for Wire Gauze. "Textiles and Their Testing," His Majesty's Stationery Office (London), 1951, p. 45-50. (Based on R.A.E. Report by F. Millard.)

Weathering tests and resistance of material to wear and puncture. Ni and Cu were used. Data are tabulated. (R3, Q9, Ni, Cu)

201-R. (Pamphlet) **Interim Report of the Departmental Committee on the Deterioration of Cast Iron and Spun Iron Pipes.** British Ministry of Health, 1950, 48 pages. 3s, 6d.

Mainly concerned with external deterioration. Considers internal conditions only where they have a direct bearing on external corrosion. Micrographs. 26 ref. (R general, CI)

202-R. (Book) **Corrosion Testing.** Francis L. LaQue. 89 pages. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa., $1.50.

Corrosion testing programs and methods of corrosion testing, many of which have been sponsored by the ASTM. Atmospheric corrosion studies; relations between rust color and corrosion; effects of alloying elements on the resistance of steels and irons to atmospheric corrosion; comparison of atmospheres; and galvanic corrosion. Originally presented as the Edgar Marburg Lecture. (R11)

203-R. (Book) **Textiles and Their Testing.** 86 pages. 1949. His Majesty's Stationery Office, London W.C.2, England. (Selected Government Research Reports, v. 4.)

Results of tests on durability of fabric. Includes metal plated fabric and nylon. (R general, Q9)

204-R. Corrosion and Pipe Protection. Marshall E. Parker. *American Gas Journal,* v. 176, Apr. 1952, p. 25-28.

Underground corrosion of iron and steel. Standard electrode potentials are measured for most metals. Includes role of H_2, anodes and cathodes, cathodic protection, pipe coatings and sacrificial anodes. (R10, Fe, ST)

205-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 44, Apr. 1952, p. 89A, 90A, 92A.

Data in chart form for corrosion of six materials Pb, carbon steel, Durimet 20, Duriron, and two high-Ni alloys, by H_2SO_4 at temperatures up to boiling and concentrations from 0-100%. (R5, Pb, CN, Ni, CI, SG-g)

206-R. Molten Sulphur; Corrosion of Steel at Temperatures up to 450° C. *Iron and Steel,* v. 25, Apr. 1952, p. 137.

Mechanism and rate law for the corrosion of metals with the formation of sulphides. The progress of corrosion was recorded conductometrically. Weight-loss tests were made, and samples of the sulphide scale were examined by microscopic and X-ray methods. (R6, ST)

207-R. An Electron Diffraction Study of Films Formed by Sodium Nitrite Solution on Iron. M. Cohen. *Journal of Physical Chemistry,* v. 56, Apr. 1952, p. 451-453.

Mechanism by which $NaNO_2$ inhibits corrosion of Fe. The passive film formed by $NaNO_2$ is γ-Fe_2O_3 with a small amount of γ-$Fe_2O_3.H_2O$. The oxide film is formed by a reaction between nitrite (and oxygen) and metal at liquid-metal interface, with adsorption of inhibitor as a probable intermediate step. Tables. (R10, Fe)

208-R. The Electromotive Series for Metals and Alloys. *Metal Finishing,* v. 50, Apr. 1952, p. 89.

A list with brief notes. (R1)

209-R. Sweet-Oil-Well Corrosion. H. L. Bilhartz. *Oil and Gas Journal,* v. 50, Apr. 21, 1952, p. 116-118, 151, 153.

See abstract from *World Oil;* item 198-R, 1952. (R7, ST, Ni, Zn)

210-R. New Light on How to Combat Corrosion in Water-Flood Operations. F. A. Prange. *Oil and Gas Journal,* v. 50, Apr. 14, 1952, p. 148, 150-152, 155.

Appraisal of three clear-cut types of solutions to the problem of controlling this particular situation. (R4, ST)

211-R. Weld Decay in Stainless Steels. Marshall E. Parker. *Oil and Gas Journal,* v. 50, Apr. 21, 1952, p. 179.

A brief discussion in reference to intergranular corrosion. (R2, K general, SS)

212-R. How to Make Brass Liners Work. William C. Uhl. *Petroleum Processing,* v. 7, Apr. 1952, p. 475-477.

Brass linings are used to provide satisfactory corrosion resistance in lines and vessels carrying gasoline liquid and vapor. Sketches show some of the methods Sun Oil Co. worked out and applied in lining process lines, vessels, and fittings. (R7, Cu)

213-R. Prevention of Corrosion of Ships in Sea Water. II. Cathodic Protection by Impressed Currents. K. N. Barnard. *Research,* v. 5, Apr. 1952, p. 176-180.

The advantages and disadvantages of impressed current systems. (R10, CN)

214-R. Trends in Gas Turbine Engine Materials. *SAE Journal,* v. 60, Apr. 1952, p. 58-63; disc. p. 63. (Excerpts from "Trends in Gas Turbine Engine Materials", by R. H. Thielemann, J. C. Mertz, and W. P. Eddy, Jr.)

Results of a series of corrosion fatigue tests on 13 turbine-blade alloys. All are steels except one Ni-base and one Ti-base alloy. (R1, T25, ST, Ni, Ti, SG-g, h)

215-R. The Corrosion of 18-8 Stainless Steel in Acid Copper Sulphate. (A Condensation.) J. Bleton, J. Blanot, and P. Bastien. *Sheet Metal Industries,* v. 29, Apr. 1952, p. 369-370.

In view of variance in corrosion resistance in two melts of nearly identical composition, an investigation was made to determine correction. 91 melts were studied. (R6, SS)

216-R. The Occurrence of Intercrystalline Attack in Material to B.S. Specification L.40 during Anodic Treatment. B. W. Mott and M. B. Waldron. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 149-154.

Experiments were made on various types of forged material to B.S. Specification L.40 with surfaces in both sound and unsound conditions. Anodic treatment was carried out in both chromic acid and H_2SO_4 acid baths to D.T.D. 910B and dyeing was carried out with black dyestuffs, with and without additions of free acetic acid. (R2, L19, Al)

217-R. Corrosion Tests of Wrought and Cast Aluminium Alloys Anodised in Chromic Acid Solutions. E. G. Savage. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 155-161.

Alloys anodized by the Bengough-Stuart process (D.T.D. 910A), or by a 45-min. treatment at 40 volts in 10% chromic acid solution, did not reveal any differences in the protection afforded by the two treatments, whether or not they were supplemented by organic coatings. When used for the treatment of duralumin, the modified process reduced the output of a given plant owing to the higher current density required. Tabulated data. (R11, L19, Al)

218-R. Corrosion Tests of Duralumin Anodically Treated in Sulphuric Acid Baths Containing Aluminium Salts. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 162-164.

Seawater spray tests made on duralumin, after being anodically treated in 20% (vol.) H_2SO_4 solutions containing dissolved Al salts up to saturation, show that the serviceability of these films is practically equal to that of anodic films produced in 20% (vol.) H_2SO_4 free from Al salts. Anodic films which have been sealed by immersion in boiling water for 30 min. are more protective than unsealed films. (R11, L19, Al)

219-R. Corrosion Tests of Duralumin Anodically Treated in Chromic Acid Solutions. H. C. Davis. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 165-170.

Investigation of the resistance to corrosion by seawater of specimens of duralumin to B.S. Specification 3L3 anodically treated in electrolytes containing 3, 5 and 10% CrO_3 at various stages of exhaustion, using the normal Bengough voltage-cycle. Some specimens were also treated in 10% CrO_3 solutions at constant voltages of 30 and 40 v. (R11, L19, Al)

220-R. Variations in Corrosion Properties on Different Parts of Magnesium Alloy Sheet. E. R. W. Jones and M. K. Petch. (Appendix on the Determination of Small Amounts of Iron in Magnesium Alloys. A. Bacon and H. C. Davis.) "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 171-186.

Seawater spray corrosion tests were carried out on chromate-treated specimens selected at regular intervals from large sheets of Mg alloys to specifications D.T.D. 118 and 120A, in order to discover any variation in corrodibility from part to part of the sheets. Method for the determination of small amounts of Fe in Mg alloys. (R11, L14, S11, Mg)

221-R. Corrosion Tests on Aluminium Alloy Sheet Clad With an Aluminium Coating of 99.36% Purity. C. Braithwaite. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 255-257.

Results of tests show that no appreciable loss of mechanical properties with the 99.5% or 99.36% Al coating occurred as a result of corrosion. Corrosion was, however, more severe with these materials than with a purer cladding material. (R11, L22, Q general, Al)

222-R Tantalum. Allan L. Percy. *Chemical Engineering,* v. 59, Apr. 1952, p. 259-260, 262-264.

Charts giving corrosion data for a number of corrosives. (R general, Ta)

223-R. Concentrating Films: Their Role in Boiler Scale and Corrosion Problems. H. M. Rivers. *Combustion,* v. 23, Apr. 1952, p. 57-63.

The concept is developed that a film of a very highly concentrated solution tends to form on steam-generating surfaces and may cause scale formation. Characteristic effects of concentrating films and related deposition problems. (R2)

224-R. How Does Titanium Scale at High Temperatures? P. H. Morton and W. M. Baldwin, Jr. *Iron Age,* v. 169, May 1, 1952, p. 133-138.

Characteristics of material from the U. S. Bureau of Mines that was studied. Summary of existing information on the scaling of Ti in O_2 or N_2. (R2, Ti)

225-R. A New Anodic Method for the Transfer of Oxide Films From Heat-Tinted Iron to Glass or Plastic. U. R. Evans and R. Tomlinson. *Journal of Applied Chemistry,* v. 2, Mar. 1952, p. 105-109.

The specimen carrying the oxide film to be transferred is cemented to glass, and the metal is dissolved away by anodic action, leaving the film attached to the glass. The area of the pieces transferred can be measured, and the metal (or metals) in the films estimated by micro-analysis; alternatively, by transferring to glass coated with petroleum jelly, the wrinkling or curling of the film gives information about stresses present in the films when they are attached to the metal. 11 ref. (R2, Fe)

226-R. Sodium Benzoate and Other Metal Benzoates as Corrosion-Inhibitors in Water and in Aqueous Solutions. F. Wormwell and A. D. Mercer. *Journal of Applied Chemistry,* v. 2, Mar. 1952, p. 150-160.

Sodium benzoate is an effective inhibitor of the corrosion of mild steel in distilled water, a moderately hard water and very dilute NaCl solutions. Electrode-potential measurements and film-stripping experiments indicate that anodic inhibition produces and maintains a continuous film. Electron-diffraction examination of the strip film has so far yielded definite evidence of γ-ferric oxide (or Fe_3O_4) only. 10 ref. (R10, CN)

227-R. Some Factors in Anodic Processes on Corroding Metals. T. P. Hoar and U. R. Evans. *Journal of the Electrochemical Society,* v. 99, May 1952, p. 212-218.

It is suggested that the onset of aqueous corrosion is controlled by the relative ease with which cations can pass through the original air-formed oxide film on the metal. A rapid supply of dissolved O_2 to all parts of the surface may arrest cations as they emerge, thus thickening the film and preventing corrosion; a far more rapid supply of O_2 is needed to prevent corrosion on Fe or Zn than on stainless steel, but the supply needed is diminished if an inhibitor is present. 46 ref. (R1, R10, Fe, Zn, SS)

228-R. Tests on Heat-Resisting Cast Irons. M. M. Hallet. *Journal of the Iron and Steel Institute,* v. 170, Apr. 1952, p. 321-329.

Data for all usual heat resisting cast irons, for selection of most suitable material for given conditions. Includes studies on resistance to scaling, and failure by cracking. Tables, graphs, and micrographs. (R2, Q26, CI)

229-R. Oxidation of Titanium. *Journal of Metals,* v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 534-536.

Discussion of paper by M. H. Davies and C. E. Birchenall. See item 411-R, 1951. (R2, Ti)

230-R. On the Mechanism and Kinetics of the Scaling of Iron. *Journal of Metals,* v. 4, May 1952, *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 536-540.

Discussion of paper by M. H. Davies, M. T. Simnad, and C. E. Birchenall. See item 412-R, 1951. (R2, Fe)

231-R. Combination of Metals and Non-Metals. U. R. Evans. *Metal Treatment and Drop Forging,* v. 19, Apr. 1952, p. 172.

Mechanism with reference to chemical reactions with liquids. Considers Fe, Cu, Zn, and Ag. (R1, Fe, Cu, Zn, Ag)

232-R. The Theory of Overvoltage and Mechanism of the Attack of Metals in Solution Out of Contact With Oxygen. (In French.) René Audubert. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Mar. 10, 1952, p. 1166-1168.

Theory which makes it possible to specify whether dissolution is either direct or the result of a secondary reaction. Includes calculation. (R1)

233-R. Electrolysis of Phosphoric Acid Between Copper Electrodes. Case of Weak Current Densities. (In French.) Denise Laforgue-Kantzer. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Mar. 17, 1952, p. 1284-1287.

Experimental and theoretical discussion of the mechanism of anodic dissolution of Cu at very weak current densities, particularly when the Cu^+ ion concentration is high. Graphs. (R1, Cu)

234-R. The Cathodic Corrosion of Iron and the Anodic Formation of Crystallized Ferrite by Electrolysis of Molten Sodium Hydroxide. (In French.) M. Dodero. *Journal de Chimie Physique et de Physico-Chimie Biologique;* v. 49, Feb. 1952, p. C210-C213; disc., p. C213.

Electrolysis of molten NaOH between 500 and 750° C., using iron electrodes under particular conditions of current density and distance between electrodes. Cathodic corrosion and anodic formation of crystallized sodium ferrite were observed. Graphs and diagrams. (R1, Fe)

235-R. Aluminum-Copper Clamps for Overhead Lines. (In German.) G. Dassetto. *Aluminium,* v. 28, Jan.-Feb. 1952, p. 31-32.

Galvanic corrosion occurs when Al and Cu come in contact, especially in the presence of moisture. Method of prevention in which a clamp of 99.5% Al is used as "material reserve", being attacked instead of the Al wire. (R1, Tl, Al, Cu)

236-R. The Problem of Corrosion in the Cooling Tubes of Transverse-Tube Coolers. (In German.) Wilhelm Guntermann. *Gas und Wasserfach,* v. 93, Apr. 1, 1952, p. 169-171.

Reduced solubility of gases in the heating water may cause O_2 and CO_2 to accumulate along the tube walls and thus contribute to corrosion. Graphs and diagrams. (R4)

237-R. Aluminum and Water. (In German.) Max Schenk. *Metalloberfläche,* v. 4, sec. B, Mar. 1952, p. B33-B36.

Corrosion resistance of Al to various types of water, such as rain water, fresh water, sea water, and distilled water. Reasons for the existence of corrosion resistance; nature of the different types of corrosion. (R4, Al)

238-R. Chemical Changes on the Surface of Tin-Lead-Copper Alloys. (In German.) R. Strebinger and R. Niederhuemer. *Mittellungen des Chemischen Forschungsinstitutes der Wirtschaft Osterreichs,* v. 6, Feb. 1952.

Chemical, microchemical, and microscopic studies of surface damage on the metal ornaments of stone coffins. Photomicrographs. (R11, Pb, Sn, Cu)

239-R. Rust. (In German.) Manfred Ragg. *Werkstoffe und Korrosion,* v. 3, Mar. 1952, p. 102-105.

Rust damage to iron structures and resulting economic losses; theories of rusting, effects of inclusions, etc. Formation of Fe-H alloys at the surface. Relation to behavior of the iron column at Delhi, India, iron objects in the pyramids, iron construction at high altitudes. Phenomenon of passivation. (R1, R10, Fe)

240-R. Active State and Spontaneous Repassivation of Electrically Activated Iron in Nitric Acid. (In German.) Klaus J. Vetter. *Zeitschrift für Elektrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Feb. 1952, p. 106-115.

Use of oscillography to determine minimum, maximum, and stationary potential in the active state; poten-

tial of the critical point at repassivation; and related times as functions of type of iron, HNO_3 concentration, HNO_2 concentration, persistent cathodic current density, stirring, temperature, and Fe-ion concentration. Tables and graphs. 45 ref. (R10, Fe)

241-R. The Influence of Oxide Layers, as Well as of Chlorine Ions Upon the Electrochemical Behavior of Passive Iron, Chromium, and Iron-Chromium in Dilute Nitric Acid. (In German.) Theo Heumann and Wolfgang Rösener. *Zeitschrift für Metallkunde,* v. 43, Feb. 1952, p. 42-44.

Report on tests with Cr and on an Fe alloy containing 20% Cr, as well as on alloys containing less Cr. Polarization curves. Stability of the oxide film. 10 ref. (R1, Fe, Cr)

242-R. Influence of Phosphorus on the Oxidation of Iron at High Temperatures. (In Italian.) Nello Collari. *Metallurgia Italiana,* v. 44, Mar. 1952, p. 97-102.

The metalloid can develop a remarkable protective action, due to the formation of an iron-phosphate rich layer between the metal surface and the exterior oxidized layers. The layer of phosphate governs the oxidation phenomenon reducing the diffusion activity of the iron. Micrographs and tables. (R2, Fe)

243-R. Study of Some Electrochemical Phenomena by Means of an Electrical Weighing Device. (In Italian.) Paolo Spinedi. *Metallurgia Italiana,* v. 44, Mar. 1952, p. 109-116.

Passivation behavior of Ni, Sn, and Ag was studied. In the case of Ni it was found that variations in the exposed surface of the test bars examined result in a characteristic surface critical parameter curve. For Sn, the curves obtained show how the passivation process is influenced by the valence state in which the element dissolves in the etching medium under the action of an applied emf. Ag is anodically oxidized by a mechanism which leads to very slight modifications of the critical parameters.
(R10, Ni, Sn, Ag)

244-R. Structure and Corrosion. (In Russian.) G. V. Akimov. *Izvestiia Akademii Nauk USSR,* Section of Chemical Sciences, Sept.-Oct. 1951, p. 469-480.

An experimental study was made of the corrosion of several metals and alloys by a variety of media. The structure of the metal and corrosion products was studied in relation to the rate and process of corrosion. Data are tabulated and charted. (R general, M27)

245-R. Oxidation of Magnesium and Its Alloys at Elevated Temperatures. (In Russian.) I. A. Makolkin. *Zhurnal Prikladnoi Khimii,* v. 24, May 1951, p. 460-470.

Surface oxidation of Mg, Al, Zn, and two Mg-Al alloys in air was investigated. The two alloys were also tested in N_2, CO_2, and SO_2. Equipment; tabulated and charted data. (R2, Mg)

246-R. Influence of Deformation on the Corrosion of Metals. (In Russian.) E. M. Zaretskii. *Zhurnal Prikladnoi Khimii,* v. 24, May 1951, p. 477-484.

See abstracts of parts I and II, *Chemical Age;* items 344-R and 368-R, 1951.
(R general, R11, Q24, Al, Zn, Cu, ST)

247-R. A Study of the Passivity of Stainless Steel. (In Russian.) G. P. Maitak and N. N. Gratsianskii. *Zhurnal Prikladnoi Khimii,* v. 24, May 1951, p. 545-547.

The electrode potentials of 18-8 specimens were measured in H_2SO_4 and $FeSO_4$-H_2SO_4 solutions. Data are tabulated.
(R10, SS)

248-R. Corrosion of Metals by Hydrocarbon Solutions of Carboxylic Acids. (In Russian.) L. G. Gindin and V. A. Kazakova. *Zhurnal Prikladnoi Khimii,* v. 24, Sept. 1951, p. 958-969.

The corrosion of Mg, Fe, and Pb by various organic acids dissolved in hydrocarbons was investigated. Data are tabulated. 15 ref.
(R6, Mg, Fe, Pb)

249-R. Corrosion of Copper and Lead by Hydrocarbon Solutions of Iodine. (In Russian.) L. G. Gindin and M. V. Pavlova. *Zhurnal Prikladnoi Khimii,* v. 24, Oct. 1951, p. 1026-1032.

Results of laboratory investigation. Equipment and tabulated data.
(R6, Cu, Pb)

250-R. Film-Rupture Mechanism of Stress Corrosion. Hugh L. Logan. *Journal of Research of the National Bureau of Standards,* v. 48, Feb. 1952, p. 99-105.

A study of the mechanism of stress-corrosion. Films were removed by abrasion in an argon atmosphere from surfaces of an Al alloy, two brasses, a Mg alloy, and low-carbon steel. Stress-corrosion is postulated to occur, in corrosive media, at stresses sufficient to rupture the protective film, by electrolytic action between the filmed (cathodic) and film-free (anodic areas). Graphs and charted data. 15 ref.
(R1, Al, Cu, Mg)

251-R. Effect of Phosphorus on Magnesium Alloys. *Metal Progress,* v. 61, May 1952, p. 156, 158, 160, 162. (Condensed from "The Effect of Phosphorus on the Corrosion Resistance of Magnesium and Some of Its Alloys". E. F. Emley, A. C. Jessup, and W. F. Higgins.)

Previously abstracted from *Journal of the Institute of Metals.* See item 404-R, 1951. (R general, Mg)

252-R. How Good Are Substitute Radiator Materials? *SAE Journal,* v. 60, May 1952, p. 58-64.

A discussion emphasizing the corrosion aspect, by a panel composed of R. W. Scoville, Joseph Gurski, R. J. Birkholz, J. H. Cooper, and J. R. Holmes. Considers Al; brass; Pb-alloy, Cu, and brass-coated steel; Zn fins; bare and painted steel; redesigning; and corrosion inhibitors. (R general, T21, Cu, Al, Pb, Zn, ST)

253-R. Report on the Conservation of Metals by Corrosion Control. Georges Chaudron. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 212-213; disc., p. 240-244.

Defines the problem; outlines various corrosive environments. (R general)

254-R. Costs of Corrosion to the United States. Herbert H. Uhlig. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 213-218; disc., p. 240-244.

Economic estimate of direct costs, showing specific dollar figures for a series of items. 15 ref. (R general)

255-R. The Costs of Corrosion and of Its Control. W. H. J. Vernon. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources," 1951, p. 218-222; disc., p. 240-244.

In relation to the world shortage of metals and the increasing demands upon the world's metal resources. Older estimates of the annual loss of steel and iron by corrosion are reviewed in the light of present knowledge. Large-scale reduction in the corrosivity of the main environments to which metals are exposed can be looked for only in atmospheric corrosion, (atmospheric pollution). A wider and more enlightened application of preventive measures is urged. 17 ref. (R general)

256-R. Prevention of Corrosion by Means Other Than Protective Coatings. F. L. LaQue. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 227-234; disc., p. 240-244.

Control or modification of environments to which metals are exposed. This may involve reduction in humidity below certain critical limits, addition of specific chemicals which inhibit corrosion reactions, control of air supply, or control of flow of corrosives in contact with the metals. Also cathodic protection, proper design, and addition of alloying elements. 90 ref. (R10)

257-R. Cost and Benefits of Conservation of Cast Iron and Steel Pipelines by Control of Corrosion. J. E. Carriere and C. A. Lobry De Bruyn. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 234-237; disc., p. 240-244.

The Dutch Corrosion Committee's specifications for pipe coatings. A chemical and physical procedure for testing of soils for corrosiveness. Economic advantages of a high-grade protective coating over a cheap coal-tar dip. (R8, CI, ST)

258-R. Fundamental Researches on Corrosion Work of the "Committee for Electro-Chemical Thermodynamics and Kinetics". Marcel Pourbaix and Pierre Van Rysselberghe. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 238-240; disc., p. 240-244.

Includes typical graphs from "Atlas of Electrochemical Equilibria" now being prepared at the Universities of Oregon and of Brussels. (R general, P15)

259-R. Corrosion and Formation of a Negative Ferric Hydrate Sol. (In French.) M. O. Charmandarian and N. N. Andronikova. *Bulletin de la Société Chimique de France,* Jan.-Feb. 1952, p. 99-101.

Corrosion of iron, in the presence of gum arabic, in water and in solutions of NaCl and Na_2SO_4, is accompanied by formation of the negative sol of ferric hydrate. Corrosion depends on amount of gum arabic and on concentration of the solutions. Data are tabulated. (R5, Fe)

260-R. Mechanism of Corrosion by Oxygen. (In French.) Rene Audubert. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Mar. 31, 1952, p. 1448-1450.

The theory of overvoltage is applied to the corrosion of metals in the presence of oxygen, making it possible to explain the mechanism of the phenomenon. (R2)

261-R. Corrosion of Cast Iron With or Without Previous Oxidation by Liquid Zinc. (In French.) Paul Bastien and Pierre Azou. *Fonderie,* Mar. 1952, p. 2831-2845.

Corrosion by molten Zn of cast iron not previously oxidized, and of cast iron previously oxidized by heating in air for 8 hr. at 850° C. Tables, graphs, diagrams, and micrographs. (R6, Zn, CI)

262-R. (Book) **Performance of Lubricating Oils.** H. H. Zuidema. 179 pages. 1951. Reinhold Publishing Corp., 330 W. 42nd St., New York 36, N. Y.

Summarizes and evaluates available data on performance characteristics of lubricating oils under various conditions. The subject is approached from the point of view of performance, rather than specific application. Chapters are devoted to the lubrication process, flow characteristics, sludge and lacquer deposition, bearing corrosion, emulsification and foaming, viscosity, pour point, and extreme-pressure lubrication. (R7, SG-c)

263-R. Aluminum. R. L. Horst. *Chemical Engineering,* v. 59, May 1952, p. 300, 302, 304, 306, 308-310, 312-314, 316.

Corrosion resistance of aluminum and its alloys to more than 100 common corrosives—with data on applications, compositions, and mechanical properties.
(R general, T general, Q general, Al)

264-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 44, May 1952, p. 103A-104A, 106A.

Several methods used in the literature for presenting or summarizing corrosion data. (R general)

265-R. On the Cubic Law of Oxidation. J. T. Weber. *Journal of Chemical Physics,* v. 20, Apr. 1952, p. 734-735.

Experimental and theoretical studies are reviewed including those on Fe and Cu. Data for Ta and Ti indicate that this growth law may apply to more metals than suspected in the past. Graphs. 11 ref.
(R2, Ta, Ti, Fe, Cu)

266-R. Kinetics of Formation of Oxide Layer on Zinc. Walter J. Moore. *Journal of Chemical Physics,* v. 20, Apr. 1952, p. 764.

A theoretical discussion, with mention also of copper oxidation.
(R2, Zn, Cu)

267-R. Precipitation of Colloidal Ferric Oxide by Corrosion Inhibitor Ions. W. D. Robertson. *Journal of Physical Chemistry,* v. 56, May 1952, p. 671-672.

The relative precipitating power with respect to a ferric oxide sol of anions employed as corrosion inhibitors was determined. Concludes that this power is not a significant factor in the corrosion-inhibition mechanism. (R10, Fe)

268-R. A Review of Information on the Effect of Impurities on the Corrosion Resistance of Aluminium. Part I. General Considerations. Part II. Aluminium. Part III. Wrought Alloys—Wrought Aluminium-Copper-Magnesium Alloys (Al-Cu-Mg). Part IV. Wrought Aluminium-Magnesium Alloys. Part V. Wrought Aluminium-Magnesium Silicide Alloys. Part VI. Wrought Aluminium-Manganese Alloys. Part VII. Wrought Aluminium-Zinc-Magnesium and Aluminium-Zinc-Magnesium-Copper Alloys. Part VIII. Cast Aluminium-Copper-Silicon and Aluminium-Magnesium Alloys. Part IX. Cast Aluminium-Silicon Alloys. Part X. Cast Aluminium-Zinc-Magnesium Alloys. Marjorie Whitaker. *Metal Industry,* v. 80, Mar. 7, 1952, p. 183-186; Mar. 14, 1952, p. 207-212; Mar. 21, 1952, p. 227-230; Mar. 28, 1952, p. 247-251; Apr. 4, 1952, p. 263-266; Apr. 11, 1952, p. 288-289; Apr. 18, 1952, p. 303-305, 313; Apr. 25, 1952, p. 331-332; May 2, 1952, p. 346-350; May 9, 1952, p. 387-388.

A comprehensive review. 175 ref.
(R general, Al)

269-R. Cooling Water Treatment With Surface Active Materials. W. F. Oxford, Jr. *Petroleum Processing,* v. 7, May 1952, p. 620-622.

Experiences encountered in use of surface-active agents in preventing scale and corrosion in the circulating cooling-tower water of gas compressor plants. Includes weight-loss curves on soft-iron test strips. Tables and photographs. (R10, Fe)

270-R. Stop Tank Bottom Corrosion With Cathodic Protection. *Petroleum Processing,* v. 7, May 1952, p. 659, 661.

An example at a West Coast refinery, for protecting 12 large oil storage tanks. Diagram. (R10, CN)

271-R. What Can Be Done to Combat Corrosion of Refinery Tank Roofs? H. F. McConomy and J. J. Hur. *Petroleum Refiner,* v. 31, May 1952, p. 124-126.

A study made of various materials used to prolong the serviceable life of refinery tank roofs. (R3, ST)

272-R. The Truth About Fretting: Corrosion Problem Really Physical Change. *Steel,* v. 130, May 19, 1952, p. 103.

Experiments which show the physical nature of fretting, formerly considered as a corrosion problem. Any chemical reaction is secondary. Proper lubrication can ease the problem. Steel and Pt are mentioned. (R1, Q9, ST, Pt)

273-R. Weathering of Sheet-Metal Building Material. *Technical News Bulletin* (National Bureau of Standards), v. 36, May 1952, p. 72-74.

Two-year atmospheric exposure tests of a number of sheet metals used in building construction have recently been completed. Sheets of Al and Zn alloys and of Al-coated and galvanized steel were exposed to the weather. Each metal tested was fastened to bare wooden boards with nails of various materials, both with and without Neoprene or lead sealing washers between the nail head and the sheet. Results are summarized. (R3, Al, Zn, ST)

274-R. Potential and Passivity. (In French.) A. Rius and A. S. Terol. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Libreria Editrice Politecnica Cesare Taburini, Milan, Italy), 1951, p. 202-203; disc., p. 203-204.

The various concepts relative to passivity, electrode potential, and corrosion of Fe. Includes graphs. (R10)

275-R. Methods of Studying Corrosion Inhibitors and Activators. (In French.) L. Cavallaro and A. Indelli. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Libreria Editrice Politecnica Cesare Taburini, Milan, Italy), 1951, p. 205-217; disc., p. 218.

Mechanisms, methods for determining intensity of the protective and stimulating action, and methods of calculating their effects for practical usage. Includes tables. 37 ref. (R10)

276-R. Remarks on Corrosion and Passivation of Metals. (In French.) M. Pourbaix and P. Van Rysselberghe. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Libreria Editrice Politecnica Cesare Taburini, Milan, Italy). 1951, p. 219-229; disc., p. 230-231.

Behavior of soft steel in an aqueous bicarbonate solution; behavior of an 18-8 Cr-Ni steel in an acetic acid solution; and behavior of 18-8-2 Cr-Ni-Mo steel in an acetyl chloride solution. Schematic drawing, graphs, tables. (R10, CN)

277-R. An Example of Good Performance of Architectural Light-Metal Parts. (In German.) H. Neunzig. *Aluminum,* v. 28, May 1952, p. 150-152.

Signboard of anodized Al-Mn with letters of anodized Al-Mg-Si, exposed to a marine atmosphere for 14 years. Appearance of the latter was very satisfactory; that of the former, anodized in a thinner layer, was less satisfactory. (R3, L19, Al)

278-R. Irreversible Electrode Potentials of Iron in Electrolytes Containing Corrosion Inhibitors. (In Russian.) I. L. Rozenfel'd. *Izvestiia Akademii Nauk SSSR,* Section of Chemical Sciences, Nov.-Dec. 1951, p. 674-677.

A study was made of electrolytes containing sodium nitrite and zinc sulfate as inhibitors. Data are charted. (R10, P15, Fe)

279-R. Corrosion of Iron by Benzene Solutions of Iodine. (In Russian.) L. G. Gindin and M. V. Pavlova. *Zhurnal Prikladnoi Khimii,* v. 24, Nov. 1951, p. 1151-1155.

Laboratory tests; apparatus and method. It was found that FeI_2 is first formed and is then transformed to Fe_2O_3, liberating the iodine for further attack. Data are tabulated. (R6, Fe)

280-R. Oxidation of Alloys by the Wire Life Test Method. Anton deS. Brasunas and Herbert H. Uhlig. *ASTM Bulletin,* May 1952, p. 71-75.

Advantages, disadvantages, and results of method for rapid evaluation of alloys and various metal surface treatments for high-temperature oxidation. Wires were chiefly of Cr-Fe and Ni-Cr alloys. Tables, graphs, and photographs. (R2, Fe, Ni, SG-h)

281-R. Corrosion—Design It Out! R. B. Mears. *Canadian Metals,* v. 15, May 1952, p. 24, 26.

Causes, recommended design principles, selection of materials, and use of protective coatings. (R general, L general)

282-R. Condensed Phosphates and Corrosion Control. B. Raistrick. *Chemistry & Industry,* May 10, 1952, p. 408-414.

Discusses use of phosphate compounds for controlling corrosion of both ferrous and nonferrous metals. Mechanism of corrosion and of inhibitors; cathodic and anodic control with condensed phosphates; tuberculation, pitting, and successful use of metaphosphate at low pH, and role of Ca in corrosion control.

Results of X-ray and optical studies of orientation of calcite on steel, and of anodic and cathodic effects, using two methods. 23 ref. (R10)

283-R. Gas Turbines. Part Two (b). I. G. Bowen. *Coke and Gas,* v. 14, May 1952, p. 161-166.

Fuels for the gas turbines with particular reference to solid fuels and gases. Corrosion problems and methods for overcoming them. Equipment diagrams, graph. (To be continued.) (R7, SS, Ni, SG-g, h)

284-R. Better Connector Life Vital to the Use of Aluminum in Distribution. C. E. Baugh. *Electrical World,* v. 137, June 2, 1952, p. 82-85.

Unsatisfactory performance of present connectors in rural areas removed from coastal contamination indicates the problem may be universal, with location affecting only the timing. Illustrations show corroded connectors. (R3, T1, Al)

285-R. Use of Magnesium Anodes in Cathodic Protection of Tanks and Pipelines. L. E. Magoffin. *Journal, American Water Works Association,* v. 44, May 1952, p. 407-412.

Experiences of California Water & Telephone Co. Although the overall cost is slightly higher than that of rectifier-type cathodic protection, ease of handling and adaptation more than offset additional cost. (R10, Mg, ST)

286-R. Corrosion and Cathodic Protection of Pipelines. W. R. Schneider. *Journal, American Water Works Association,* v. 44, May 1952, p. 413-426; disc., p. 427.

Confined to installations of continuous steel pipelines under water or in soil at normal soil temperature. Test procedures and protective methods (electrical or by use of graphite or Mg anodes.) (R10, ST)

287-R. Cathodic Protection of Steel Water Tanks. C. Kenyon Wells. *Journal, American Water Works Association,* v. 44, May 1952, p. 428-434.

Procedures and experiences of Long Beach Water Dept., Calif., indicate that cathodic protection of the interior surfaces of steel water-storage tanks is limited to those areas below the average highwater line. It still remains necessary to protect those areas above this level with some type of coating. Use limited to non-ice-forming months of the year. (R10, ST)

288-R. A Note on Filiform Corrosion. F. Hargreaves. *Journal of the Iron and Steel Institute,* v. 171, May 1952, p. 47-48.

Filiform type of corrosion was induced on polished carbon-steel specimens exposed to the atmosphere. Corrosion tracks, originating from slag inclusions, developed after 24 hr. exposure; they showed brilliant interference colors. Some filiform corrosion tracks also occurred on coated specimens. (R2, CN)

289-R. Correspondence on the Paper "Corrosion By Retained Treatment Chemicals on Phosphated Steel Surfaces", by S. G. Clarke and E. E. Longhurst. *Journal of the Iron and Steel Institute,* v. 171, May 1952, p. 58.

Discussion by R. J. Brown of above paper (Jan. issue), plus authors reply. See item 103-R, 1952. Illustrates "snail-trail" and filiform corrosion. (R6, L14, ST)

290-R. The Oxidation of Metals and Alloys. Erich Scheil. *National Advisory Committee for Aeronautics,* Technical Memorandum 1338, June 1952, 16 pages. (Translated from *Zeitschrift für Metallkunde,* v. 29, July 1937, p. 209-214.)

Mechanism of oxidation, citing evidence from the literature in verification of the theory postulated for oxidation and for formation of layers resistant to further oxidation. 29 ref. (R2)

291-R. Cathodic Protection of Buried Pipelines. K. A. Spencer. *Petroleum,* v. 15, May 1952, p. 121-123; June 1952, p. 149-153.

Part I: General survey. Part II: The type of survey that should be carried out before cathodic protection methods are applied to an existing pipeline. The protection equipment required. 13 ref. (R10, ST)

292-R. Protection of Electric Equipment Against Corrosion In Industrial Plants. Harold E. Springer. *Transactions of the American Institute of Electrical Engineers,* v. 70, pt. 2, 1951, p. 1605-1611; disc., p. 1611-1612.

See abstract from *Electrical Engineering,* item 440-R, 1951. (R10, T1)

293-R. Measuring Effectiveness of Rust-Preventive Oils. (In German.) Alexander Philippowich. *Erdöl und Kohle,* v. 5, Apr. 1952, p. 211-214.

Characteristics of the oils. Different methods of measuring rate of rusting of ferrous metals coated with different oils. Tables and graphs. (R10, Fe)

294-R. The Oxidation of Liquid Tin. (In German.) Wolfgang Gruhl and Ursula Gruhl. *Metall,* v. 6, Apr. 1952, p. 177-182.

Experiments made on pure Sn at temperatures of 325 and 600° C., and on Sn with up to 1% additions of

Li, Na, Mg, Al, Zn, Cd, Sb, Pb, Bi, and Cu. The experimental results show that only those metal additions which are less noble than Sn, with the exception of Cd, speed up the oxidation. In the case of Al, even as slight an addition as 0.5% will completely inhibit the oxidation of Sn. Tables, charts and micrographs. (R2, Sn)

295-R. The Cathodic Protection Process and Its Application to Protection of Soil-Embedded Pipelines. (In German.) Heinrich Steinrath. *Metalloberfläche,* sec. A, v. 6, Apr. 1952, p. A49-A52.

(R10, ST)

296-R. Effect of Sonic and Ultrasonic Vibrations on Electrochemical Processes. (In German.) Albert Roll. *Metalloberfläche,* Apr. 1952, sec. B, v. 4, p. B49-B53; May 1952, p. B65-B70.

Research shows that ultrasonics may prevent as well as increase passivity of surface coatings. The qualitative effect of weak ultrasound is similar to mechanical stirring. Intense ultrasound changes or destroys passivation by cavitation and impairment of passivating coatings. Part II: Effect of different factors on electrolytic separation of gases under influence of ultrasonics. Diagrams and graphs. 18 ref. (R10)

297-R. Resistance to Intergranular Corrosion of Ferritic and Martensitic Stainless Chromium Steels. (In German.) Eduard Houdremont and Walter Tofaute. *Stahl und Eisen,* v. 72, May 8, 1952, p. 539-545.

Investigation of stainless steels with 15-30% Cr with or without additions of Mo, Al, Si, P, Ti, Ta, Cl, and V regarding their tendency to intergranular corrosion, their hardness and structure. Carbide precipitation as a cause of intergranular corrosion. Modification of the theory of chromium impoverishment. Tables and graphs. (R2, SS)

298-R. Variation of Corrosion by Wetting Agents. III. Influence of the Constitution of Cation-Active Wetting Agents. Luigi Riatti. *Werkstoffe und Korrosion,* v. 3, May-June 1952, p. 186-188.

It was previously shown that the presence of wetting agents can prevent pitting action of tap water on unalloyed steel. An anion-active and several non-ionic wetting agents were found to be suitable. Two cation-active wetting agents examined under similar conditions gave, in one case, practically total protection of the steel; in the other, attack was stronger than by water without admixture. Both the products were derived from the same mono-acetylated diamine. Surface tensions were only slightly different. Since chemical constitution is apparently of decisive importance, use of only tested wetting agents is recommended. (R4, CN)

299-R. Definitions and Mechanism of Passivity. (In German.) Roberto Piontelli. *Werkstoffe und Korrosion,* v. 3, May-June 1952, p. 188-192.

Internal factors, initial surface state; conditions of environment; operative conditions; and specific properties of compounds which form protective layers. (R10)

300-R. Limits of Electrochemical Investigation of Corrosion Processes and Oxygen Contents. (In German.) Fritz Tödt. *Werkstoffe und Korrosion,* v. 3, May-June 1952, p. 205-209.

How initial corrosion can be used for determination of the oxide-film and local cell-effect between oxide and basic metal by colorimetric measurement of dissolved iron salts. Such measurements have a practical importance for timely recognition of corrosion danger in iron evaporators. A second more accurate method is sensitive to as low as 0.001% O_2. This process has proved satisfactory for determining very small quantities of O_2 in feed water of high-pressure plants. 11 ref. (R11)

301-R. Influence of Composition of Stainless Steel on Resistance to Sulfuric and Hydrochloric Acids. (In German.) Karl Bungardt and Hans Joachim Rocha. *Werkstoffe und Korrosion,* v. 3, May-June 1952, p. 209-211.

Shows changes of corrosion resistance with composition by means of 2 and 3-dimensional graphs. Two groups are distinguished on the basis of passivity characteristics. (R5, SS)

302-R. Prediction of the Appearance of Rust Damage in Warm-Water Plants. (In German.) Günther Seelmeyer. *Werkstoffe und Korrosion,* v. 3, May-June 1952, p. 211-217.

Formation of internal corrosion and scaling in waterworks equipment does not depend—as generally assumed—entirely on chemical nature of the water. Effects of kind and quality of materials used and of construction and operation of the plants are also important. Attempts to clarify these factors and to give more exact definitions of the concepts of aggressive, scale-forming, and non-scale-forming waters. Tables. (R4)

303-R. The Interaction of Iron With Ozone. (In Russian.) R. Kh.

Burshtein and N. A. Shumilova. *Doklady Akademii Nauk SSSR*, new ser., v. 83, Mar. 11, 1952, p. 251-252.

A study was made of the formation of oxide films on iron specimens by ozone. Data are tabulated and charted. (R2, Fe)

304-R. The Chromium Impoverishment of Grain Boundaries as a Cause of Intercrystalline Corrosion of Stainless Steel. (In Russian.) I. A. Levin. *Doklady Akademii Nauk SSSR*, new ser., v. 83, Apr. 11, 1952, p. 701-704.

Corrosion tests on low-carbon Fe-Cr alloys indicate that intercrystalline corrosion is not due to Cr impoverishment. Tables and graphs. (R2, SS)

305-R. The Engineering Aspects of Intimate Metallic Surfaces. H. E. Arblaster. *Australasian Engineer*, Mar. 7, 1952, p. 43-58.

Cavitation erosion, covering mechanism, effect of some variables, testing cavitation resistance; metallic wear, covering galling, scuffing, etc.; problems of metallic surfaces nominally at rest; problems of surfaces in motion; friction and frictional resistance of metals; lubrication by thin metallic films; surface films; boundary lubrication; extreme pressure lubricants; and fretting corrosion and variables affecting it. Tables and photographs. 34 ref. (R1, R2, Q9, SG-c)

306-R. Corrosion Problems in Ion Exchange Systems. J. F. Wilkes. *Corrosion* (News Section), v. 8, June 1952, p. 1-2.

(R5)

307-R. Isolation of Trolley Bus Negative Return to Prevent Stray Current Corrosion. L. Horvath, H. E. Nerhood, S. M. Seidman, and R. H. Travers. *Corrosion* (Technical Section), v. 8, June 1952, p. 205-211.

When a rail-transportation system is converted to trolley-bus operation, there is a tendency to continue the use of rails for negative return. In Akron and Youngstown the resultant problems, corrosion and otherwise, finally led to abandonment of rail return and isolation of the negative return from ground. (R10)

308-R. A Case History Involving Intergranular Failure of Stainless Steel Heater Tubes. G. A. Works. *Corrosion*, (Technical Section), v. 8, June 1952, p. 217-221.

Failure of a number of Type 316 stainless steel tubes in a fired heater at a phenol solvent treating plant after 10 years of service. Metallurgical investigations showed that carbide precipitation at the grain boundaries had occurred at about 750° F. Heat treatment was carried out on the uncracked tubes and they were re-installed in the heater. No further difficulty was encountered after 24 months. Photomicrographs. (R2, J23, SS)

309-R. Aluminum Conductor and Connectors. C. E. Baugh. *Edison Electric Institute Bulletin*, v. 20, June 1952, p. 185-188.

See abstract of "Better Connector Life Vital to the Use of Aluminum in Distribution", *Electrical World*, item 284-R, 1952. (R3, T1, Al)

310-R. The Anodic Oxidation of Platinum at Very Low Current Density. S. E. S. El Wakkad and Sayeda H. Emara. *Journal of the Chemical Society*, Feb. 1952, p. 461-466.

Reaction is carried on in acid, neutral, and alkaline solutions by the direct potentiometric method, using a special cell and constant current unit. (R2, EG-c)

311-R. The Kinetics of the Dissolution of Zinc in Aqueous Iodine Solutions. Parts III and IV. A. C. Riddiford and L. L. Bircumshaw. *Journal of the Chemical Society*, Feb. 1952, p. 698-704.

Part III: Zn, Cu, amalgamated Cu, brass, Pb, and Ni were found to dissolve in aqueous iodine solutions at the same rate under the same experimental conditions. Observed rate of dissolution of Zn was independent of crystal face exposed to attack, but was a function of the rate of stirring. Results agree with Levich's theory. Part IV: Fluid flow. The reaction may be used to characterize fluid flow in other solid-liquid systems.
(R5, P13, Zn, Cu, Pb, Ni)

312-R. Passivity of Iron in Nitric Acid. Harry C. Gatos and Herbert H. Uhlig. *Journal of the Electrochemical Society*, v. 99, June 1952, p. 250-258.

Passivity of iron in HNO_3 was studied employing iron films evaporated on glass. Influence of preexposure to various types of environments on the precise amounts of iron dissolving in HNO_3 before passivation reaction practically ceases. 13 ref. (R10, Fe)

313-R. The Influence of Inhibitors on the Dissolution of Iron in Acid Solution. J. Elze and H. Fischer. *Journal of the Electrochemical Society*, v. 99, June 1952, p. 259-266.

Results of experiments, showing differences in the mechanism of action of various types. Graphs and tables. (R10, Fe)

314-R. Aluminum Corrosion Prevention. Part 1. George W. Orton. *Light Metal Age,* v. 10, Apr. 1952, p. 10-11, 33.

Aspects of direct chemical attack. (To be continued.) (R1, Al)

315-R. Operations and Maintenance of Pipe Line Cathodic Protection Systems. Marshall E. Parker. *Petroleum Engineer,* v. 24, June 1952, p. D36, D38-D40, D42, D44.

Factors that make supervision necessary, and inspection methods for three basic types of cathodic protection systems. (R10)

316-R. Control of Corrosion in Locomotive Diesel Engines. A. C. Mengel. *Railway Mechanical and Electrical Engineer,* v. 126, June 1952, p. 65-68.

Illustrations show appearance of corroded diesel-engine cylinder liners. Application of four preventive measures: proper maintenance of SO_4-CO_3 ratio; maintenance of proper ratio of $NaNO_3$ to alkalinity in feedwater; use of steel of lower tensile strength in boiler construction, so that stresses at grain boundaries are lower; and adoption of the all-welded, stress-relieved boiler. Use of chromates in the cooling water is also discussed. (R10, ST)

317-R. The Prevention of Corrosion in Packaging. I. The Use of Sodium Benzoate as a Corrosion-Inhibitor in Wrappings. II. Temporary Protectives From Rubber Latex and Other Aqueous Dispersions. III. Vapour-Phase Inhibitors. E. G. Stroud and W. H. J. Vernon. *Journal of Applied Chemistry,* v. 2, Apr. 1952, p. 166-184.

Experimental work on corrosion prevention of mild steel, cast iron, and nonferrous metals using a variety of the materials and techniques indicated in the subtitles, and under a variety of conditions. 19 ref. (R10, L26)

318-R. (Pamphlet) **Atmospheric Exposure Tests of Nailed Sheet Metal Building Materials.** Theodore H. Orem. *National Bureau of Standards,* Building Materials and Structures Report 128, Mar. 28, 1952, 24 pages.

Tests of nailed metallic building sheets of Al, Al alloy, Al-coated steel, galvanized steel, and Zn alloy exposed for 2 years to the atmospheres of Washington, D. C., and Hampton Roads, Va. The tests indicate that improper installation practices can cause accelerated corrosion of such materials. Recommendations regarding installation procedures. Tables, micrographs, and macrographs. (R3, K13, Al, ST, Zn)

319-R. Report of Subcommittee II on Performance Tests. Atmospheric Exposure of Copper-Nickel-Chromium Deposits on High-Carbon Steel. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 204-213.

Previously abstracted from Preprint 13S. See item 265-R, 1951. (R3, Cu, Ni, Cr, CN)

320-R. Corrosion Testing: Twenty-Fifth Edgar Marburg Lecture. F. L. LaQue. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 495-582.

Corrosion-test procedures and typical results described by text, tables, graphs, and photographs. Atmospheric corrosion studies; acid testing; other accelerated tests; relations between rust color and corrosion; effects of position in test; long-time tests of different steels and irons to atmospheric corrosion; comparison of atmospheres; corrosion tests of insect screens; tests in waters; galvanic corrosion; atmospheric galvanic corrosion tests; salt-spray tests; laboratory total-immersion tests; alternate immersion tests; boiling HNO_3 test; plant corrosion tests; and paint tests. Includes statistical analysis of atmospheric corrosion data on Cu-bearing steels in a marine atmosphere. 95 ref. (R11)

321-R. The Scaling of Zirconium in Air. C. A. Phalnikar and W. M. Baldwin, Jr. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 1038-1059; disc., p. 1059-1060.

Both O_2 and N_2 enter into the scaling reaction. Zr forms a double-layered scale: an outer white or buff scale (monoclinic ZrO_2) that predominates at temperatures below 1050° C. and an inner black scale (monoclinic and tetragonal ZrO_2, cubic ZrN, and possibly N) that occupies the greater thickness at temperatures above 1050° C. The outer white layer does not form immediately but requires a definite time to nucleate. Zr strip also undergoes extraordinary dimensional changes during scaling. Increases in dimensions in the rolling plane trebled the original sample area in some cases. Graphs and photomicrographs. 12 ref. (R2, Zr)

322-R. Report of Committee D-19 on Industrial Water. *American Society for Testing Materials,* Preprint 48, 1952, 19 pages.

Includes proposed method of sampling steam and water at subatmospheric pressure and proposed corrosivity test for industrial water (USBM Embrittlement Detector Method.) (R4, ST)

323-R. Atmospheric Corrosion of Low Alloy Steels. H. R. Copson. *American Society for Testing Materials,* Preprint 70, 1952, 22 pages.

In 1941 five sets of 71 low-alloy steels were exposed to the industrial atmosphere at Bayonne, N. J., and to the marine atmosphere at Block Island, R. I. Gives complete results through 9-year exposure, including weight losses, pit depths, thickness measurements, calculated pitting factors, and weight of rust on the specimens. Detailed weight loss vs. time curves, pit-depth vs. time curves, and weight-loss vs. composition curves are plotted. (R3, AY)

324-R. Galvanic Corrosion. E. C. Reichard. *Chemical Engineering Progress* (Engineering Section), v. 48, June 1952, p. 269-271.

Galvanic corrosion, and ways to prevent costly failures within chemical plants. (R1)

325-R. Chemical Causes of Wear. J. J. Broeze. *Engineering,* v. 173, May 30, 1952, p. 693-694.

Three typical fields in which chemical causes of wear, of practical significance, have been identified: general lubrication, where there is chemical attack by the atmosphere; in engine and gear lubrication, with chemical attack by the lubricants; and in engine lubrication, with chemical attack by the combustion products. Data are charted. (R7, R3)

326-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 44, June 1952, p. 81A-82A, 84A.

Materials of construction for handling caustic, with particular reference to stress-corrosion of welded steel. Graphs. (R1, ST)

327-R. The Weathering of Sheet Metal Building Materials. Theodore H. Oren. *Modern Metals,* v. 8, May 1952, p. 60, 62.

Previously abstracted from *Technical News Bulletin (National Bureau of Standards).* See item 273-R, 1952. (R3, Al, Zn, ST)

328-R. Velocity of Action of Oxygen, Hydrogen Sulfide, and Halogens on Metals. G. Tammann and W. Köster. *National Advisory Committee for Aeronautics,* Technical Memorandum 1339, June 1952, 21 pages. (Translated from *Zeitschrift für anorganische und allgemeine Chemie,* v. 123, Aug. 1952, p. 196-201, 208-224).

Results of investigation tabulated, charted, and discussed. Fundamental equations of the process. Application to a large number of specific metals and alloys. (R9)

329-R. Atmospheric Exposure Tests of Nailed Sheet Metal Building Materials. Theodore H. Orem. *National Bureau of Standards,* Building Materials and Structures Report 128, Mar. 28, 1952.

See abstract of "The Weathering of Sheet Metal Building Materials", *Technical News Bulletin* (National Bureau of Standards); item 273-R, 1952. (R3, Al, Zn, ST)

330-R. Influence of Sulphate-Reducing Bacteria on the Corrosion Potential of Iron. J. N. Wanklyn and C. J. P. Spruit. *Nature,* v. 169, May 31, 1952, p. 928-929.

A study made under both autotrophic and heterotrophic conditions using Armco ingot iron. Graph. (R1, Fe)

331-R. Film-Rupture Mechanism of Stress Corrosion. *Technical News Bulletin* (National Bureau of Standards), v. 36, Apr. 1952, p. 54-55. (Condensed from "Film-Rupture Mechanism of Stress Corrosion", Hugh L. Logan.)

Previously abstracted from *Journal of Research of the National Bureau of Standards.* See item 250-R, 1952. (R1, Al, Cu, Mg)

332-R. Analysis of Some Corrosion Problems in Petroleum Refineries. J. F. Mason, Jr. *Transactions of the American Society of Mechanical Engineers,* v. 74, Apr. 1952, p. 305-312; disc., p. 312-313.

Fifteen actual corrosion problems and steps taken to analyze them in the light of practical experience and available test data obtained under the same or similar conditions. Indicates that Type 502 stainless steel is a highly acceptable and reasonably economical material as a replacment for mild steel, except in instances where mineral acids or chlorides may be present as well as highly alkaline solutions at elevated temperatures. Under the latter conditions, the trend is toward use of more highly alloyed materials such as Monel and Ni together with Cu-base alloys like 70-30 cupronickel, Admiralty metal, and Muntz metal. (R5, SS, Cu, Ni)

333-R. (French and German.) **Corrosion Resistance of Aluminum and "Aldrey" Cables.** G. Dassetto. *Aluminium Suisse,* v. 2, May, 1952, p. 96-99.

Behavior of the "Aldrey" Al alloy in particularly difficult climate zones. Various examples of its use in practice. 14 ref. (R3, T1, Al)

334-R. (German.) **The Tube Camera of the Ruhrgas AG.** Walter Wunsch and Siegfried Brockhaus. *Gas- und Wasserfach,* v. 93, May 15, 1952, p. 229-233.

Stereoscopic camera which can be inserted into gas pipe lines under pressure in order to study internal corrosion. Typical results. (R11)

335-R. (German.) **The Influence of Adsorption Phenomena on the Oxidation of Metals at Elevated Temperatures.** H. J. Engell and K. Hauffe. *Metall,* v. 6, June 1952, p. 285-291.

Discusses the reaction mechanism of oxidation on the basis of the literature, with particular regard to the views advanced by Moore and Lee *(Transactions of the Farady Society;* item 274-R, 1951.) Graphs. 19 ref. (R2, Zn)

336-R. Report of Committee A-5 on Corrosion of Iron and Steel. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 109-125.

Previously abstracted from Preprint 4, 1951. See item 238-R, 1951. (R general, ST, Zn, Cu, Pb)

337-R. Report of Committee A-5 on Corrosion of Iron and Steel. *American Society for Testing Materials,* Preprint 4, 1952, 17 pages.

Recommendations for revisions in standards, specifications, and test methods. Extensive tabular data on atmospheric corrosion of 22-gage Cu-bearing, non-Cu-bearing, and galvanized, black, corrugated sheet steel. Specification revisions for Zn-coated sheet steel.
(R general, R3, S22, Fe, ST)

338-R. Corrosion of Metals Near Wood. *Chemical Age,* v. 66, June 7, 1952, p. 871-872.

Chemical factors that influence wood-metal compatibility, on the basis of work of the British Forest Products Research Laboratory. Mentions especially lead and iron.
(R7, Pb, Fe)

339-R. New Standard for Coating Thickness. Max Kronstein. *Chemical Engineering,* v. 59, June 1952, p. 201-203.

Coating thickness should be three times the profile depth to resist moisture penetration. This conclusion was reached after measuring the profile of grit-blasted steel surfaces and determining the effect of various thicknesses of organic coatings on moisture penetration. The electrographic printing method was used to detect moisture penetration and under-film spreading of moisture, and profiles were studied by a surface analyzer. Charts and electrographic prints.
(R11, S15, ST)

340-R. Hastelloy Alloy C. Edward D. Weisert. *Chemical Engineering,* v. 59, June 1952, p. 297-298, 300, 302, 304-306, 308-310, 312.

Corrosion resistance of this Ni-Mo-Cr alloy to more than 150 corrosives, with data on a variety of properties and processes, forms available, and applications. Numerous charts. (R general T29, Ni)

341-R. What's Ahead in Corrosion Prevention. Herbert H. Uhlig. *Chemical Engineering,* v. 59, June 1952, p. 314.

Extensions and improvements in cathodic protection, coatings of various types, deaeration, inhibitors, etc. (R10, L general)

342-R. Corrosion Problems in Industry. W. H. J. Vernon. *Chemistry & Industry,* June 14, 1952, p. 524-526.

Briefly discussed. (R general)

343-R. The Corrosion of Gas-Burning Appliances. J. Welsh. *Chemistry & Industry,* June 21, 1952, p. 551-555.

Experimental methods have been developed for measuring the dew-point and, hence H_2SO_4 vapor concentration in combustion products, and new techniques for evaluating the extent of corrosion of metallic specimens by deposition of H_2SO_4 from the products of combustion of manufactured gas containing sulfur. It is shown that serious problems may occur in domestic water heaters. Methods of attacking these problems. 14 ref. (R9)

344-R. Gravimetric Investigation Into the Oxidation of Copper-Tin Alloys at Various Temperatures. F. De Carli and N. Collari. *Engineers' Digest,* v. 13, June 1952, p. 183-185, 193. (Translated.)

Previously abstracted from *Metallurgia Italiana.* See item 144-R, 1952. (R2, Cu, Sn)

345-R. Combating Corrosion From Industrial Chemicals. George Shaffer. *Industry and Power,* v. 63, July 1952, p. 75-90.

Special report includes extensive charts, tables, and graphs. 37 ref. (R6, R7)

346-R. Fretting Corrosion Studies With a Modified Fafnir Machine. T. G. Roehner and E. L. Armstrong. *Institute Spokesman,* v. 16, June 1952, p. 8-9, 11-12, 15.

Compares original and modified Fafnir testers. Test procedure and results of tests on 11 lubricating grease-additive combinations. (R1)

347-R. A Contribution to the Study of the Action of Certain Inhibitors Upon Corrosion in Chloride-Polluted Water. W. S. Patterson and A. W. Jones, *Journal of Applied Chemistry,* v. 2, May 1952, p. 273-280.

Comparative effects of potassium dichromate, sodium nitrite, sodium benzoate, and soluble oil as corro-

sion inhibitors were partially examined. The corrosion media used were NaCl solution and dilute sea water. Tables, photographs, and graphs. (R10, R4, ST, Fe)

348-R. Film Formation on Metals in Hydrocarbons. Andrew Gemant. *Journal of the Electrochemical Society,* v. 99, July 1952, p. 279-284.

Using a radioactive-tracer technique, rate of salt-film formation on Cu, Pb, and Zn, in solutions of tridecanoic acid in hydrocarbon oil was measured. Effects of amine addition and oxidized oil. Film formation by electrochemical action was studied on Pb and Ag. Tables and graphs. (R7, Cu, Pb, Zn, Ag)

349-R. The Rate of Corrosion of Silver in Ferric Perchlorate Solutions. Cecil V. King and Frances S. Lang. *Journal of the Electrochemical Society,* v. 99, July 1952, p. 295-300.

Effect of concentration of ferric, ferrous, and silver ions, of other salts including sulfates, and of stirring speed, temperature, and electrical polarization. Evidence for the existence of a sulfato-ferric ion. Tables and graphs. 14 ref. (R5, Ag)

350-R. A Potentiometric Study of the Interaction of Zinc Ions With Sodium Silicates. J. Fred Hazel, Wallace M. McNabb, and Paul E. Machemer. *Journal of the Electrochemical Society,* v. 99, July 1952, p. 301-307.

Zn SO_4, Zn Cl_2, and Zn $(NO_3)_2$ were titrated potentiometrically with standard solutions of NaOH and various Na silicates. Results from the standpoint of use of silicates as inhibitors of aqueous corrosion of Zn. Graphs and table. 32 ref. (R10, Zn)

351-R. A Mechanism of Stress-Corrosion in Aluminium-Magnesium Alloys. C. Edeleanu. *Journal of the Institute of Metals,* v. 80, Dec. 1951, p. 187-191.

Attack on Al and Al-rich alloys, immersed in neutral chloride solutions, tends to be restricted to a limited area owing to the autocatalytic nature of the anodic reaction. On homogeneous alloys, corrosion causes scattered pits which can increase either in depth or in area; but in the case of alloys possessing a path of easy corrosion, attack takes the form of trenching and is confined to the tips of the cracks so formed. This latter type of corrosion leads to great mechanical weakening. From experiments on Al 7% Mg alloy, it is concluded that stress exerts no influence during the first stages of the process but that corrosion plays a vital role during the final rapid cracking. 13 ref. (R1, Al)

352-R. The Dissolution of Metals Over the Temperature Range of 25 to −60°. III. The Dissolution of Zinc in Hydrochloric Acid—Methyl Alcohol-Water Solutions. J. Y. Welsh and A. B. Garrett. *Journal of Physical Chemistry,* v. 56, June 1952, p. 727-730.

Data were obtained for the rates of depolarized dissolution of polished and pre-etched Zn in HCl-CH_3OH-H_2O solutions under dynamic conditions. (R5, P13, Zn)

353-R. Aluminum Corrosion Prevention. Part 2. Causes and Results of Electrochemical Action Described. George W. Orton. *Light Metal Age,* June 1952, p. 18-20.

(R1, Al)

354-R. A Parabolic Law for Metal Oxidation Which Is Not Controlled by Diffusion. W. J. Moore. *Philosophical Magazine,* ser. 7, v. 43, June 1952, p. 688-689.

(R2)

355-R. Aluminium Versus Tinned-Steel Milk Cans—A Comparative Study. Glenn R. Watson, L. R. Bryant, and W. H. Sproule. *Scientific Agriculture,* v. 32, June 1952, p. 337-350.

Investigations included effect of milk and cream; effect of cleaning and sterlizing solutions on Al and tinned steel; the numbers of bacteria remaining in milk cans after commercial cleaning; and the effect of service. Graphs and tables. 12 ref. (R7, T29, Sn, CN, Al)

356-R. (German.) **The Behavior of Weldments Toward Chemical Attack.** W. Rädeker. *Schweissen und Schneiden,* v. 4, June 1952, p. 198-203.

Types of chemical attack, intercrystalline attack, and effect of welding defects. Macrographs. (R2)

357-R. (German.) **The Effect of Phase Boundary Reaction in the Oxidation of Metals and Alloys at Higher Temperatures.** K. Hauffe and H. Pfeiffer. *Zeitschrift für Electrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Apr. 1952, p. 390-398.

Shows, on the basis of experimental results on oxidation of Fe to FeO at 1000° C., and on the sulfurization of Ni to NiS at 670° C., that the parabolic time law and the Wagner scaling theory are not applicable, since boundary surface reactions are rate dependent. Presence of metal oxide vapors (MoO_3 and Li_2O) in the oxidizing atmosphere increase the rate of oxidation of metals and alloys, or may decrease it, which is interpreted on the basis of the theory of the formation of defects. Tables and graphs. (R2)

358-R. (German.) **Influence of Stress and Temperature in Stress-Corrosion Experiments.** Otto Lissner. *Zeitschrift für Metallkunde,* v. 43, May 1952, p. 147-150.

Discusses the justification for the plotting of log-log coordinates for stress dependence of life duration of test pieces exposed to stress-corrosion. Temperature dependence and permissible temperature increase in stress-corrosion experiments. Data are charted for steels and Al alloys. 14 ref. (R1, R11, Al, ST)

359-R. (Italian.) **Aluminum and Its Alloys in the Wine Industry.** L. Gentilini and G. Missier. *Alluminio,* v. 21, May 1952, p. 130-134.

Al of 99.5% purity and three Al alloys were tested by immersion of strips in three types of wine for 30 days at 20 and 40° C. Corrosion took place and the taste of the wine was badly impaired. Further tests in which Al-alloy flasks were internally coated with a phenolic resin gave satisfactory results. (R7, T29, L26, Al)

360-R. (Russian.) **The Role of Nitrogen in the High-Temperature Oxidation of Titanium in Air.** V. I. Arkharov and G. P. Luchkin. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Apr. 21, 1952, p. 837-839.

The rate of oxidation of Ti and Ti-Fe alloys in air and in O_2 was investigated at temperatures up to 1200° C. Data are charted. (R2, Ti)

361-R. (Russian.) **Dissolving Steels in Sulfuric Acid Under the Influence of Ultrasonic Vibration.** A. P. Kapustin and M. A. Fomina. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Apr. 21, 1952, p. 847-849.

Steel specimens were dissolved in 1N H_2SO_4 during subjection to ultrasonic vibrations of various intensities. Data are tabulated and charted. (R5, ST)

362-R. Mercury and Its Compounds —a Corrosion Hazard. M. H. Brown, W. W. Binger, and R. H. Brown. *Corrosion* (Technical Section) v. 8, May 1952, p. 155-164.

Frequently cases of severe corrosion are encountered with equipment fabrication of nonferrous alloys long considered standard for handling or processing a specific chemical. Modified techniques for examination reveal, in most cases, presence of mercury in either the corrosion products, or on the metal surface in the vicinity of the attack, or in the environment. A series of studies was made on the role of mercury and its compounds in promoting corrosion of metals, concentration levels that cause serious attack, and manner by which such substances can be transported through chemical equipment and plants. Concentrations of Hg compounds as low as 0.5 ppm. constitute a serious corrosion hazard for a variety of metals and alloys. Numerous diagrams, graphs, tables, micrographs, and macrographs. (R6, Hg, EG-a)

363-R. Prevention of Standby Corrosion in Power Plants. Leonard Highley, Jr., and W. R. Schnarrenberger. *Corrosion* (Technical Section), v. 8, May 1952, p. 171-176; disc., p. 176-177.

A number of case histories illustrate the complexity of the problem. These describe damage to boilers, superheaters, and turbines—vital units of power plant equipment. Points which establish the fact that corrosion occurred during periods of standby. A number of practical preventive measures include both dry and wet procedures. (R4, ST)

364-R. The Corrosion of Copper and of Metals in Bi-Metallic Systems. George Richard Hill. *Corrosion* (Technical Section), v. 8, May 1952, p. 188-191.

Results of experiments in the Fuel Technology Dept., University of Utah, into the kinetics of initial corrosion of Cu in aerated salt solutions. Quick formation of a film inhibits corrosion. Theoretical considerations in corrosion of an Fe-Cu couple. 12 ref. (R5, Cu, Fe)

365-R. Results of 2-Year Sheet Metal Corrosion Tests Are Given. *Corrosion.* (News Section), v. 8, July 1952, p. 10-11.

See abstract of "Atmospheric Exposure Tests of Nailed Sheet Metal Building Materials", Theodore H. Orem, *National Bureau of Standards,* Building Materials and Structures Report 128; item 317-R, 1952. (R3, K13, Al, Zn, ST)

366-R. Aluminum Alloys for Offshore Pipe Lines. Edward T. Wanderer and Donald O. Sprowls. *Corrosion.* (Technical Section), v. 8, July 1952, p. 227-233.

Results of various corrosion tests including effects on tensile properties. Inert-gas metal-arc welding procedure used. Typical tensile properties and compositions of some Al alloys. (R4, K1, Q27, Al, SG-g)

367-R. A Hydrogen Evolution Method for Evaluation of Corrosion Inhibitors for Oil Wells. Willard R. Scott and Gibson H. Rohrback. *Corrosion.* (Technical Section), v. 8, July 1952, p. 234-240.

Method developed to simulate oil-well corrosion, using hot brine and flow conditions and with provision for inhibitor addition. Evaluation procedure and typical test results. SAE 1015 steel was used in the form of coupons. Apparatus diagrams, graphs, tables, and photograph. (R10, CN)

368-R. Vigilance Underground. By-ran Patterson. *Corrosion.* (Technical Section), v. 8, July 1952, p. 241-246, disc. p. 246.

Current practices of providing insulation and protection against electrochemical corrosion of buried pipe lines. 24 ref. (R10)

369-R. Some Observations of the Potentials of Stainless Steels in Flowing Sea Water. K. M. Huston and R. B. Teel. *Corrosion.* (Technical Section), v. 8, July 1952, p. 251-256.

Potentials of nine standard grades and three new grades of stainless steel. Effects of heat treatment, free-machining element, and crevice corrosion on emf. potentials. The relation of these potentials to those of yellow brass, Ti, Inconel, and Monel. Testing setup. Tables and graphs. (R4, R2, SS, Cu, Ni)

370-R. Cathodic Protection Against Corrosion of Heating and Plumbing Equipment. T. W. Reynolds. *Heating and Ventilating,* v. 49, Mar. 1952, p. 83-94.

A comprehensive report. Schematic diagrams. (R10)

371-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 44, July 1952, p. 71A-72A, 74A.

Corrosion resistance of Ta, Cb, Zr, W, and Mo metals. Tables. (R general, Ta, Cb, Zr, W, Mo)

372-R. Highly Alloyed Stainless Has More Acid Resistance. Helmut Thielsch and W. E. Pratt. *Iron Age,* v. 170, July 10, 1952, p. 135-139.

Resistance to H_2SO_4. Results of corrosion tests. Effects of chemical and phase composition on corrosion, and composition of a number of commercial Cu-bearing stainless steels with high Ni-Cr content. Briefly mentions grain structure. Table, graphs, and micrographs. 11 ref. (R5, M27, SS)

373-R. Some Notes on Corrosion. H. L. Rice. *Paint and Varnish Production,* v. 43, July 1952, p. 27, 52-53.

Causes of corrosion; electrolytic theory; and nonpolar materials. (R1)

374-R. Some Problems of Corrosion in the Steel Industry. Herbert L. Coe. *Steel Equipment & News,* v. 5, June 1952, p. 7-10.

(R general, ST)

375-R. Aluminum Alloy Dock Pilings Prove Immune to Salt Water. Gilbert S. Schaller. *Western Metals,* v. 10, June 1952, p. 53.

Use of Al alloy beams in dock pilings. They have proven to be corrosion and barnacle-resistant. (R1, R4, Al)

376-R. (Book—Japanese). **Electrolysis Control Handbook.** (Denshoku Boshi Hand Book). Rev. Ed. 466 pages. 1952. Institute of Electrical Engineers of Japan, Tokyo. 600 Yen.

Modern theories and practices concerning electrolysis control. Practical examples and tabulated data. Statistics on corrosion damage to communication and power cables in Japan; theory of underground corrosion; analysis of stray-current distribution from railways; rail bonding; railway current feeding systems; measurement of stray currents; cable sheath and pipeline currents. Material on chemical analysis of earth, underground water, and deposits on corroded metals; methods of mitigating corrosion on lead sheaths and pipe lines; cathodic protection, inhibitors; protective coverings; estimating corrosivity of underground water; and recommended specifications for cable sheaths. Current governmental regulations to protect underground structures and examples of similar regulations in other countries. (R9, R10)

377-R. (Book). **Korrosionstabellen metallischer Werkstoffe geordnet nach angreifenden Stoffen.** (Corrosion Tables of Metallic Materials Arranged According to the Materials Attacked.) Ed. 3. Franze Ritter. 283 pages. 1952. Springer-Verlag, Vienna, Austria.

Includes classified list of 991 references from which the data were obtained. (R general)

378-R. Preserving What You Have: From the Corrosion Engineer's Viewpoint. E. A. Tice. *Chemical Engineering Progress* (Engineering Section), v. 48, July 1952, p. 329-332.

Effects of aeration or presence of oxidizing agents; velocity of media flow or agitation effects; and temperature. Data for stainless steels, high-Ni alloys, cupronickels, and Zn are charted. (R10, Zn, SS, Ni, Cu)

379-R. Corrosion in CO_2-H_2S-Amine System. E. C. Carlson, G. R. Davis, and K. L. Hujaak. *Chemical Engineering Progress* (Engineering Section.), v. 48, July 1952, p. 333-335; disc., p. 335-336.

The increased utilization of natural gas from sour gas areas has multiplied the number of plants us-

ing amine systems for gas sweetening. In some cases, severe corrosion problems have been encountered. Operating conditions were simulated on a pilot scale. It was found that the metal attack could be reproduced when the amine contained small residual amounts of both CO_2 and H_2S and the heat medium was oil at 500° F. Reduction of the oil temperature to 370° F. practically eliminated corrosion in the pilot unit. (R7, CN)

380-R. Effect of Annealing on the Resistance of Galvanized Steel to Atmospheric Corrosion. S. E. Hadden. *Journal of the Iron and Steel Institute,* v. 171, June 1952, p. 121-127.

Exposure tests of galvanized steel wire and sheets, as-received and annealed for various times at different temperatures; effect of annealing on structure, composition, and mechanical properties of galvanized steel wire; and mechanical strength of wires after test. Tables, graphs, and photomicrographs.
(R3, Q general, M27, Sn, ST)

381-R. Corrosion Studies at "Sea Horse Institute". *Metal Progress,* v. 62, July 1952, p. 88-89, 124.

Facilities at International Nickel Co.'s marine corrosion laboratory, Harbor Island, North Carolina.
(R11)

382-R. The Effect of Iron on the Corrosion Resistance of Copper-Nickel Alloys. *Metal Progress,* v. 62, July 1952, p. 174, 176. (Condensed from "Copper-Nickel-Iron Alloys Resistant to Sea-Water Corrosion", G. L. Bailey.)

Previously abstracted from *Journal of the Institute of Metals.* See item 298-R, 1951. (R4, Cu)

383-R. Pitting of Aluminum in a Heavy-Water Reactor. *Nucleonics,* v. 10, July 1952, p. 19.

The fuel rods in the heavy-water reactor at Kjeller, Norway, consist of uranium slugs stacked inside aluminum tubes with 2-mm. walls. Pitting and corrosion have affected the outer surface of these tubes where they were immersed in the heavy-water moderator. (R2, Al)

384-R. Air Brake Corrosion Problems. C. E. Macfarlane. *Railway Mechanical and Electrical Engineer,* v. 126, July 1952, p. 72-76.

Corrosion of essential parts of this equipment which consists of various control valves, usually made mostly of cast iron, or in some cases Al, and which contain parts made of brass, Zn die castings, steel, and plastics. (R3)

385-R. Corrosion. 6. Prevention of Corrosion by Means of Inhibitors. R. S. Thornhill. *Research,* v. 5, July 1952, p. 324-332.

Recent theories of inhibitive action. Properties of the more common inhibitors, and their industrial uses. 41 ref. (R10)

386-R. Experimental Superheater for Steam at 2000 Psi and 1250 F—Progress Report of Field Operation. F. G. Ely and F. Eberle. *Transactions of the American Society of Mechanical Engineers,* v. 74, July 1952, p. 803-812; disc., p. 812.

To investigate the properties of new superstrength alloys for high-temperature steam superheater service a test element constructed of 2-in o.d. alloy tubes was installed in an operating boiler at Twin Branch plant and supplied with steam at 2000 psig. and 950° F., which was heated at 1250° F. Operating conditions, and results of the first 5000 service hr. Croloy 2¼; types 304, 316, 318, 321, and 347 stainless steels, Timken 16-25-6, and Armco 17-14 Cu-Mo were tested. Internal surface conditions and microstructures of the tubes after test were examined. (R4, SS, SG-g, h)

387-R. Behavior of Superheater Tubing Materials in Contact With Combustion Atmospheres at 1350 F. H. A. Blan, A. M. Hall, and J. H. Jackson. *Transactions of the American Society of Mechanical Engineers,* v. 74, July 1952, p. 813-819.

Report on the field-test phase of experiments at Battelle Memorial Institute. Materials tested were austenitic stainless steels, Ni-base alloys, and aluminized cold rolled steel. Tables, diagrams, graphs, and photomicrographs. 11 ref.
(R2, SS, Ni, Cn, Al)

388-R. (French.) **The Resistance of Light Alloys to Marine Corrosion.** Andre Guilhaudis. *Revue de l'Aluminium,* v. 29, Mar. 1952, p. 85-91; Apr. 1952, p. 127-133; May 1952, p. 175-179.

First part: Marine corrosion test stations established at Salin-de-Giraud and St-Jean-de-Luz by the Service des Recherches et Essais Physiques de Chambery of the Pechiney Company, in France. Second part: Behavior of unprotected Al and light alloys, Al-Mn, Al-Mg, Al-Mg-Si, Al-Cu-Mg, when submitted to spray, permanent immersion, and alternate immersion-emersion. Influence of work-hardening and tension; of the quenched and tempered state; and of thickness, partial annealing, and orientation of the test piece. Third part: Al-Zn-Mg

and Al-Zn-Mg-Cu alloys. In the casting alloys, the Al-Mg alloys offer the best resistance. Plating with Al or Al-Zn provides good protection for some alloys. Resistance to marine corrosion of Cu, Ni, Sn, Zn, ordinary steel for ships' hulls, stainless steel, and brass. (R4, Al)

389-R. (French.) **Structure and Corrosion of Al-Mg and Al-Zn-Mg Alloys. Mechanism of Intergranular Corrosion and Stress Corrosion.** Pierre A. Jacquet. *Revue de Métallurgie,* v. 49, May 1952, p. 339-363.

Preparation of the specimens, and the experimental arrangement. Numerous optical and electron micrographs illustrate results obtained. Includes tabular and graphical data. (To be continued.) (R1, R2, Al)

390-R. (French.) **Structure and Corrosion of Aluminum-Magnesium and Aluminum-Zinc-Magnesium Alloys. Mechanism of Intergranular and Stress-Corrosion.** (Concluded.) **Part III. Structure and Corrosion of Aluminum-Zinc-Magnesium Alloys. Part IV. Mechanism of Intergranular Corrosion and Stress-Corrosion.** Pierre A. Jacquet. *Revue de Métallurgie,* v. 49, June 1952, p. 439-452.

Reviewed on the basis of the literature. Nature of the alloys, influence of thermal treatment on surface conditions, and of plastic deformation on corrosion. The mechanisms of anodic attack and of stress-corrosion. Tables, graphs, and micrographs. 36 ref. (R1, R2, Al)

391-R. (German.) **Investigation of the Formation of Black Stains on the Running Surfaces of Rails.** Walter Jäniche. *Stahl und Eisen,* v. 72, June 19, 1952, p. 758-765; disc., p. 765-766.

Caused by accumulation of corrosion products in the depressions. Stained rails were examined to determine influence of nonmetallic inclusions and rupture at the edges due to excessive loads. (R11, Q4, CN)

392-R. (German.) **The "Inverse Dependence" of the Corrosion of Metals on Some Influencing Factors.** G. Schikorr. *Metall,* v. 6, July 1952, p. 356-360.

Effect of salt concentration, acid concentration, amount of the attacking substance, temperature, precipitation, and composition of the metal. 29 ref. (R2)

393-R. (German.) **Improvements in the Development of Corrosion Resisting Materials.** (General Survey). **Part I. Iron and Steel.** Erich Franke. *Werkstoffe und Korrosion,* v. 3, July 1952, p. 265-274.

Based on the most important relevant publications of 1950, a survey is given of the corrosion behavior of carbon steels, low and high-alloy stainless steels, Fe-Si alloys, and cast iron. Substitution of Ti for Cb in stabilized 18-8 stainless steels. 168 ref. (R general, Fe, ST, SG-g)

394-R. (German.) **A Specific Corrosion Phenomenon on Tungsten Contacts.** Albert Keil. *Werkstoffe und Korrosion,* v. 3, July 1952, p. 263-265.

During the storage of apparatus containing large quantities of insulating materials, corrosion products are formed occasionally on the surface of tungsten contacts. Factors promoting such reactions, and importance of the phenomenon. (R6, W)

395-R. (German.) **Anodic Solution of Germanium.** Franz Jirsa. *Zeitschrift für anorganische und allgemeine Chemie,* v. 268, nos. 1-2, 1952, p. 84-88.

Results of experimental study on behavior of germanium anodes in acid and alkaline solutions. Results are tabulated and charted. (R5, Ge)

396-R. (Italian.) **Protection of Ferrous Surfaces Against Corrosion.** Erica Antinori. *Tecnica Italiana,* v. 7, May-June, 1952, p. 163-167.

Results of further experiments similar to those described in a previous article. (Mar.-Apr. 1951 issue.) Use of more concentrated solutions was studied. An emulsible oil containing sulfonic soaps gives fairly good protection from rust on cast iron. A few practical notes on use of chromates for treatment of engine cooling water. Test-panel photographs. (R10, R4, Fe, CI)

397-R. (Russian.) **The Problem of the Mechanism Determining the Rate of Solution of Metals in Concentrated Acids.** Ia. V. Durdin. *Zhurnal Obshchei Khimii,* v. 22(84), Jan. 1952, p. 3-17.

A study was made of the solution of Fe and Cr in HCl and H_2SO_4. Data are tabulated and charted. 14 ref. (R6, Fe, Cr)

398-R. Cathodic Engineering Preview. T. E. Nicholas. *Chemical Engineering,* v. 59, July 1952, p. 220-221.

Principles of cathodic protection for chemical reaction vessels, piping, heat exchangers, etc. (R10)

399-R. Hastelloy Alloy B. Edward D. Weisert. *Chemical Engineering,* v. 59, July 1952, p. 314, 316, 318, 320, 322, 324, 326, 328.

Chart shows the corrosion resistance of this Ni-Mo alloy to 190 corrosives. Includes data on mechanical properties, applications, and forms available. (R general, Q general T general, Ni, Mo)

400-R. Corrosion Control in Water Systems. Herbert H. Uhlig. *Industrial and Engineering Chemistry,* v. 44, Aug. 1952, p. 1736-1740.

General coverage of corrosion by water in waterworks and boiler operations. Cathodic protection, protective paints, organic coatings, metallic coatings, various "inhibitors," and the use of corrosion resistant metals and alloys. 18 ref. (R11, R4, L general, ST)

401-R. Cooling Water Problems in the New York Metropolitan Area. Sidney Sussman. *Industrial and Engineering Chemistry,* v. 44, Aug. 1952, p. 1740-1744.

How water treatment utilizing alkali for pH control and chromates for passivating film formation gives the most effective corrosion control in recirculating cooling-water systems. Also control in once-through cooling-water systems. Tables and photographs. (R11, R4)

402-R. Effects of Velocity on Corrosion by Water. H. R. Copson. *Industrial and Engineering Chemistry,* v. 44, Aug. 1952, p. 1745-1752.

A general review with emphasis on Fe, Zn, Cu, and their alloys. Pertinent unpublished data are included. Graphs, photographs, and tables. 56 ref. (R4, Fe, Zn, Cu)

403-R. Effect of Temperature on Corrosion of Metals by Water. Norman Hackerman. *Industrial and Engineering Chemistry,* v. 44, Aug. 1952, p. 1752-1755.

The influence of systematic temperatures and of temperature gradients on rates and distribution of corrosion reactions. Some of the important temperature-dependent properties are oxygen solubility, galvanic potentials, and precipitation rates. Various ferrous, nonferrous, and coupled metals are considered. 21 ref. (R4)

404-R. Corrosion Control With Organic Inhibitors. J. N. Breston, *Industrial and Engineering Chemistry,* v. 44, Aug. 1952, p. 1755-1761.

Mechanism, properties, and conditions of application of organic inhibitors. Their application in acid cleaning solutions, cooling and refrigerating systems, steam-generating systems, oil wells, and other petroleum production and handling systems. Graphs. 57 ref. (R11)

405-R. Inhibitors for Eliminating Corrosion in Steam and Condensate Lines. R. C. Ulmer and J. W. Wood. *Industrial and Engineering Chemistry,* v. 44, Aug. 1952, p. 1761-1765.

Two types of treatments are advocated: introduction of alkaline substances to neutralize the acidity and introduction of film-forming materials to coat the metal. Test data were obtained in 600-psi. boiler condensate with representative materials of both types. With Cu and brass, both types gave good results. Graphs, tables, and diagrams. 22 ref. (R11, Cu)

406-R. Action of Sodium Silicate as a Corrosion Inhibitor in Water Piping. Leo Lehrman and Henry L. Shuldener. *Industrial and Engineering Chemistry,* v. 44, Aug. 1952, p. 1765-1769.

Results of anticorrosion treatment of water supplies of several hundred buildings in a number of different cities, during the past 25 years. Economical and efficient corrosion controls, together with theories of their mechanisms. Tables and graphs. 24 ref. (R11, Cu, Fe)

407-R. Protection of Metals Against Pitting Tuberculation, and General Corrosion. Combined Phosphate-Chromate Treatment. H. Lewis Kahler and Philip J. Gaughan. *Industrial and Engineering Chemistry,* v. 44, Aug. 1952, p. 1770-1774.

History of the use of chromate inhibitor. Although one of the best treatments for saving steel, it gives pitting and tuberculation when used in concentrations insufficient to stop total attack. Field data from plants now using the combination treatment show that the laboratory research data are verified in extensive plant practice. Graphs and tables. (R11, ST)

408-R. Protective Film Formation With Phosphate Glasses. G. B. Hatch. *Industrial and Engineering Chemistry,* v. 44, Aug. 1952, p. 1775-1780.

The chemical reaction involved in the inhibition of galvanic corrosion of steel coupled to cathodic metals by the glassy phosphates. Tables and graphs. 13 ref. (R10, ST)

409-R. Inhibition of Galvanic Attack of Steel With Phosphate Glass. G. B. Hatch. *Industrial and Engineering Chemistry,* v. 44, Aug. 1952, p. 1780-1786.

The effect of a number of factors commonly encountered in practice on the inhibition of the galvanic corrosion of steel coupled to copper with a glassy phosphate is quite similar to their effect on inhibition of the attack of steel alone. Numerous graphs. (R10, ST, Cu)

410-R. Pitting Corrosion Characteristics of Aluminum; Influence of Magnesium and Manganese. P. M. Aziz and Hugh P. Godard. *Industrial and Engineering Chemistry,* v. 44, Aug. 1952, p. 1791-1795.

This work was undertaken to determine the influence of alloying Mg and Mn with Al upon its pitting probability and pitting rate. Al in the purity range 99.5-99.99% was investigated using additions of 1.0% Mg, 1.25% Mn, and 0.5% Mg + 0.5% Mn. Tables, graphs, and photographs. (R2, Al)

411-R. Cathodic Protection of Steel in Contact With Water. Leon P. Sudrabin and Henry C. Marks. *Industrial and Engineering Chemistry,* v. 44, Aug. 1952, p. 1786-1791.

Protective current requirements and the reactions involved. Tables, graphs, and photographs. 30 ref. (R10, ST)

412-R. Second Report of the Methods of Testing (Corrosion) Sub-Committee. *Journal of the Iron and Steel Institute,* v. 171, July 1952, p. 255-272.

Results of a series of corrosion tests carried out in a number of laboratories. A new laboratory test developed by the Chemical Research Laboratory. Interim results, for 5 years' exposure, for the original field test. Appendix gives preliminary suggestions for the removal of corrosion products from mild steel specimens carrying protective metallic coatings, with or without paint. Tables and illustrations. (R11, ST, Al, Pb, Sn, Zn)

413-R. Fretting Corrosion. R. S. Barnett. *Lubrication Engineering,* v. 8, Aug. 1952, p. 186-188, 205-206.

Detection, mechanism, effects of various factors, cooperative work on the problem, and mitigation. Some examples. 14 ref. (R1).

414-R. Corrosion of Copper Alloys. E. Börje Bergsman. *Metal Industry,* v. 81, July 18, 1952, p. 52-53.

Some examples of corrosion attack, classified under four headings —tarnishing and oxidation, galvanic corrosion, stress-corrosion (season cracking), and dezincification. (R1, R2, Cu)

415-R. Metals and Coatings to Combat Corrosion. H. F. McConomy and J. J. Hur. *Petroleum Engineer,* v. 24, 1952, p. c28, c30.

Heavier-gage steel, Al, galvanized steel, organic resin-base coatings, and bituminous-base coatings for steel refinery tanks. (R7, L16, L26, ST, Al, Zn, CN)

416-R. Bearing Corrosion Studied. *Steel,* v. 131, July 28, 1952, p. 84, 87.

Results of tests on the Navy's amine acid inhibitor for brass retainer ball bearings. (R10, Cu)

417-R. (German.) Recent Views on the Relationship Between Electrochemical and Chemical Corrosion. A. Bukowiecki. *Chimia,* v. 6, July 15, 1952, p. 156-165.

Experiments show that a metal may be attacked simultaneously by electrochemical and purely chemical corrosion regardless of whether the liquid in contact with the metal is a poor or a good conductor of electricity. Diagrams, graphs, and tables. 38 ref. (R1)

418-R. Corrosion Resisting Characteristics of Iron Modified 90:10 Cupro Nickel Alloy. W. C. Stewart and F. L. LaQue. *Corrosion* (Technical Section), v. 8, Aug. 1952, p. 259-277.

Summary of information, particularly where resistance to attack by salt water is required. Influence of iron content and heat treatment. Behavior of the alloy under several conditions of exposure to attack by sea water. Some experiences in sulfide-polluted water and in other corrosive media. Tables, graphs, and illustrations. (R4, Cu)

419-R. Why Power Companies Should Promote Corrosion Control. H. H. Anderson. *Corrosion* (Technical Section), v. 8, Aug. 1952, p. 278-282.

Engineering methods of minimizing corrosion damage are reviewed, with frequent examples of the varying corrosion problems found among utilities. Various kinds of corrosion and methods used to combat it in electric-power, steam-generating, and other utility plants. 25 ref. (R general)

420-R. Corrosion by Fluorine and Fluorine Compounds. Ralph Landau. *Corrosion* (Technical Section), v. 8, Aug. 1952, p. 283-288.

Materials of construction useful in handling fluorine, with indications of their limitations. Specific recommendations on general design factors. General characteristics of the fluorocarbons, and of some specific fluorocarbon materials. (R5, R9)

421-R. Some Corrosion Experiences With Aluminum Crude Oil Lines. Almont Ellis. *Corrosion* (Technical Section), v. 8, Aug. 1952, p. 289-291.

Experiences with 63S-T6 extruded Al pipe indicate that efficiency of the inert-gas arc welded joint is not very high. Failure in a little more than 25 months as the result of pitting at annealed areas occurred. External corrosion at water crossings was observed in the form of $\frac{1}{16}$-in. pits after 16 months. Another line showed no evidence of external corrosion after 3½ years, although partly submerged in salt water. (R4, R7, Al)

422-R. Sour Oil Well Corrosion. TP-1D. Sour Oil Well Corrosion. J. A. Caldwell. *Corrosion* (Technical Section), v. 8, Aug. 1952, p. 292-294.

Technical Subcommittee Report. A preliminary survey of the extent of the problem was made in Arkansas, Kansas, and West Texas-New Mexico areas. Of 8125 sour-crude wells reported, about 44% were economically affected by corrosion. Costs ranged from $270 per well per year in the West Texas-New Mexico area to $2000 in the Kansas area. Substantial reduction in cost was effected in some cases by application of various remedial measures. (R7, R4, ST)

423-R. Corrosion Resistance of Titanium, Zirconium, and Stainless Steel. Lex B. Golden, I. Roy Lane, Jr., and Walter L. Acherman. *Industrial and Engineering Chemistry,* v. 44, Aug. 1952, p. 1930-1939.

Corrosion in mineral acids and inorganic chlorides. Ti, Zr, and a 20-29 Cr-Ni stainless steel show excellent resistance to all concentrations of HNO_3. In mixed-acid solutions both Ti and stainless have better corrosion resistance than Zr. Heavy-metal chloride solutions have negligible effect on Ti, while stainless steel is badly pitted and perforated. Zr is embrittled by ferric and cupric chloride solutions but unaffected by mercuric chloride. Ti and Zr are fully resistant to solutions of alkali and alkaline-earth chlorides, while stainless steel is susceptible to pitting in these media. Ti is entirely unaffected by hypochlorite solutions, Zr is slightly embrittled, and stainless steel is badly pitted. Tables, graphs, and photographs. 22 ref. (R5, Ti, Zr, SS)

424-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 44, Aug. 1952, p. 87A-88A, 90A.

Results of experiments show that stainless steels with low carbon content take a longer time at sensitizing temperatures to develop knife-line attack, or intergranular corrosion, during welding. (R2, SS)

425-R. (Book) **Corrosion Data Survey. Ed. 2.** G. A. Nelson. 64 pages. Shell Development Co., San Francisco. $35.00.

Evaluates corrosive effect of 462 chemicals in varying concentrations on a series of 25 metals, alloys, and nonmetallics. Compiled from various sources to serve as a guide for screening of likely materials of construction, particularly in oil and chemical plants. Qualitative rather than quantitative. Data are assembled in chart or graph form. Basic group of materials considered is steel (low-carbon), cast iron, Ni-Resist, Cu (including Sn and Al bronze), red brass, yellow brass, silicon bronze, 12% Cr steel, 17% Cr steel, 18-8 stainless, Monel, Ni, Inconel, Hastelloy, Durimet, Al, Pb, silicon irons, glass and stoneware, rubber, asbestos, plastics and Karbate (impervious carbon). (R general)

426-R. (Book) **The Corrosion Resistance of Tin and Tin Alloys.** S. C. Britton. 77 pages. 1952. Tin Research Institute, Fraser Road, Greenford, Middlesex, England.

Guiding principles, backed by results obtained in defined conditions, to aid in diagnosing cause of corrosion. Arranged in three parts: Corrosion of tin; alloys of tin; and coatings of tin and tin alloys. Includes coatings of Sn on Fe, steel, Cu and its alloys, Pb, and Al; Pb, Zn, Cd, Cu, and Ni as alloying elements; solders, fusible alloys, and bearing metals. Tables and numerous references. (R general, Sn, SG-c, d, f)

427-R. (Pamphlet) **The Measurement of the Dewpoint and H_2SO_4 Vapour Content of Combustion Products.** W. E. Francis. *Gas Research Board,* Communication GRB 64, June 1952, 37 pages.

Relates to corrosion-prevention studies. An electrical conductivity method for determination of SO_2 + SO_3 ratio in gaseous products of combustion. Research work covering variation of this ratio with factors such as degree of primary aeration, type of burner, and sulphur content of gas. Table, graphs, and apparatus diagrams. 31 ref. (R9)

428-R. (Pamphlet) **Report of the Director for the Year 1951.** *Gas Research Board,* Communication GRB 67, June 1952, 46 pages.

Gas production, purification and storage; refractory bricks and insulating materials; effluent problems; and utilization of gas. Latter includes a section on corrosion of appliances. (R9, B18)

429-R. Application of Fuels and Lubricants in Utility Fleet Operations. William A. Howe. *American Gas Association, Proceedings,* v. 33, 1951, p. 318-344.

Photographs, graphs, and tables show effects of fuels and various oils on engines (including wear and corrosion) and their performance. (R7, Q9)

430-R. The Elementary Mechanism of Cathodic Protection. Keith K. Reid, G. C. English, and Ralph L. Horst.

American Gas Association, Proceedings, v. 33, 1951, p. 351-360.

Fundamental mechanism illustrated with circuit and other diagrams. Tables. (R10)

431-R. The Performance of Impressed Current Ground Beds. A. W. Peabody. *American Gas Association, Proceedings,* v. 33, 1951, p. 448-455.

Summary of that part of cathodic protection engineering dealing with ground beds used to introduce protection current into the ground from an external source. Development, present practices, effects of soil conditions and anode configuration, selecting sites, and designing installations. Diagrams and chart. (R10)

432-R. Practical Experiences in Corrosion of Hot Water Tanks. R. L. Featherly. *American Gas Association, Proceedings,* v. 33, 1951, p. 456-460.

General information on this corrosion problem, including galvanized tanks; and experiences involving use of Mg rod for cathodic protection. (R4, R10, ST, Mg, Zn)

433-R. Why We Incorporate a Corrosion Control Program in the Early Stages of Construction in a Modern Gas Transmission System. E. Clyde McGraw. *American Gas Association, Proceedings,* v. 33, 1951, p. 464-466.

Experiences of Transcontinental Gas Pipe Line Corp., Houston. (R9, ST)

434-R. Special Tests for Stainless Steels. J. Lomas. *British Steelmaker,* v. 18, Aug. 1952, p. 414-417.

Surveys various mechanical and corrosion-test procedures. (R11, SS)

435-R. Electrical Method Being Tested to Protect Hulls From Corrosion. Herman S. Preiser. *Bureau of Ships Journal,* v. 1, July 1952, p. 12-14.

Use of cathodic protection. (R10, ST)

436-R. Corrosion Testing; a Tool of Conservation. E. G. Holmberg. *Chemical Engineering Progress* (Engineering Section), v. 48, Aug. 1952, p. 377-380.

Value of corrosion testing. Methods and apparatus used, and data obtained for several stainless steels, nonferrous alloys, and special high-temperature alloys in solutions of various common organic chemicals at temperatures of 223 and 270° F. Photographs and diagrams. (R11, SS, EG-a, SG-g, h)

437-R. Technical Facts for Food Processors on Nickel and High-Nickel Alloys. Part I. Corrosion Fundamentals and Specific Data on Tomato Units. *Food Engineering,* v. 24, No. 8, Aug. 1952, p. 79-81, 218, 220-221.

Compositions, mechanical properties, heat transfer rates, and corrosion resistance to tomato products. Data tabulated. (To be concluded.) (R5, P11, Q general, T29, Ni)

438-R. Weathering Tests Reveal Aluminum Nail Data and Techniques. *Light Metal Age,* v. 10, Aug. 1952, p. 18, 25.

See abstract of "Atmospheric Exposure Tests of Nailed Sheet-Metal Building Materials", Theodore H. Orem. *National Bureau of Standards,* Building Materials and Structures Report 128; item 318-R, 1952. (R3, K13, Al, ST, Zn)

439-R. The Effect of Excreta on Aluminium and its Alloys. R. Butler and E. W. Skerrey. *Light Metals,* v. 15, Aug. 1952, p. 261-266. (Reprinted with revisions from *Water and Sanitary Engineer,* Apr. 1952.)

Effects of human and animal excreta on Al and its alloys is being investigated in a sewage disposal plant, a factory latrine, and a cattle barn. Results obtained after exposures up to 3½ years indicate that Al and its alloys are suitable for use in each of these environments and that NS4 (BA.21) is the most generally suitable alloy. Photographs and tables. (R7, T29, Al)

440-R. Control Galvanic Corrosion —Stop Costly Failures. E. C. Reichard. *Materials & Methods,* v. 36, Aug. 1952, p. 83-86.

Advantages and disadvantages of several methods for either eliminating galvanic action or controlling its destructive effects, including protective coatings, inhibitors, and sacrificial anodes. (R1)

441-R. Gas-Condensate Well Corrosion. What It Costs and How to Combat It. T. S. Zajac. *Oil and Gas Journal,* v. 51, Aug. 11, 1952, p. 108, 110, 112.

Summary of what is being learned about this costly problem—what causes it, how to detect and evaluate it, and techniques and measures for controlling it. (R7)

442-R. These Tools Ferret Out Corrosion. Kenneth W. Robbins and Warner M. Kelly. *Oil and Gas Journal,* v. 51, Aug. 25, 1952, p. 114, 117, 120, 143-145.

Various means for determining location and severity of corrosion in oil and gas wells, also of different types of corrosion. (R11, ST)

443-R. Magnesium Anode Installations in the Gas Distribution System. H. M. McCamish. *Pipe Line News,* v. 24, July 1952, p. 36-38; Aug. 1952, p. 37-40.

Described and diagrammed. (R10, T4, ST, Mg)

444-R. Corrosion. 7. Corrosion Testing. W. C. Britton. *Research,* v. 5, Aug. 1952, p. 377-384.

Service, field, and laboratory tests. 46 ref. (R11)

445-R. Acids and Heat-Resisting Properties of Nodular Cast Iron. Ichiro Iitaka and Kazuhiko Sekiguchi. *Reports of the Casting Research Laboratory,* No. 3, 1952, p. 17-19.

Results for acidic and aqueous corrosion and high-temperature oxidation of nodular cast iron, ordinary cast iron, and mild steel are charted and discussed. (R5, R2 CI, CN)

446-R. Influence of Lead to Zamak Alloys for Die Casting. Nobutaro Kayama and Masakazu Ichida. *Reports of the Casting Research Laboratory,* No. 3, 1952, p. 48-51.

Effects on aqueous corrosion resistance, thermal expansion coefficent, and impact strength of Zn-Al-Cu alloys containing 0.005-0.04% Pb. Tables and graphs. (R5, Q6, P11, Zn)

447-R. How To Increase Corrosion Resistance After Welding. *Steel Horizons,* v. 14, Summer 1952, p. 20-23.

Experimental equipment. Macrographs and micrographs show effects of corrosive attack on welds in types 430 and 442 straight Cr steels. Effects of heat treatment and of Ti additions. (R general. K9, SS)

448-R. The Ferroxyl Reagent Applied to a Study of Knitting Needle Corrosion. F. Bryant. *Textile Research Journal,* v. 22, Aug. 1952, p. 553-554.

Tests were carried out on the corrosion problem and the above method proved satisfactory. Needles are of alloy steel. (R11, AY)

449-R. (French.) Research on Anodic Oxidation of Ferrochromium. V. Oxidation in Acid and Neutral Solution. Jean Besson and Ulrich Bohnstedt. *Bulletin de la Société Chimique de France,* May-June 1952, p. 624-628.

Anodic oxidation in H_2SO_4 solution. Variations with concentration of the acid, voltage, duration of the experiment, temperature, and concentration of Cr^{+3}. Data are tabulated and charted. (R2, L19, Fe-n, Cr)

450-R. (French.) Solubility of Metals in Water. J. C. Pariaud and P. Archinard. *Bulletin de la Société Chimique de France,* May-June, 1952, p. 454-456.

Investigated at room temperature, for Zn, Pb, Cu, Ag, and Hg in chemically pure water. Experimental methods, and various processes for the determination of dissolved metals. Tables. 11 ref. (R4, S11, Zn, Pb, Cu, Ag, Hg)

451-R. (German.) The Electrochemical Influence of Oxide Films and Oxygen Upon the Rate of Corrosion of Metal Surfaces, Especially of Iron. F. Tödt. *Metalloberfläche,* sec. A, v. 6, Aug. 1952, p. A125-A126.

Method for calculating the above rate. Results of experiments. 11 ref. (R1, Fe)

452-R. (German.) Influence of Furnace Atmosphere on Surface Finish of Round Ingots and Tubes. Werner Scheurer. *Stahl und Eisen,* v. 72, July 31, 1952, p. 935-941.

Laws governing the scaling process. Dependence on temperature, thickness of scale layer, time, rate of gas flow, type of gas, and its composition. Operation with oxidizing and reducing flames. Effect of an atmosphere rich in sulfur. Effect of protective gases. Experimental results tabulated, charted, and illustrated. 39 ref. (R2, J2, ST)

453-R. (German.) Materials Testing to Establish the Cause of the Explosion of a Fireless Locomotive by Fracture of the Boiler Flange. Hans Biegler. *Technik,* v. 7, Mar. 1952, p. 131-134.

Intercrystalline corrosion is shown to have been the cause of the explosion. Photographs, photomicrographs, tables and references. (R2, S21, CN)

454-R. (Italian.) Analysis of Metallic Sound as a Test Method. I. Study of Intercrystalline Corrosion in 18-8 Stainless Steels. Characteristic Symmetries in the Elastic Moduli. Oscar Masi and Antonio Ferri. *Metallurgia Italiana,* v. 44, June 1952, p. 207-214.

Details of oscillographic procedure in which the sound emitted when test pieces are struck is collected and analyzed. This method appears to have great sensitivity in comparison with others. Typical results are tabulated, charted, and illustrated. Apparatus is illustrated. (R11, SS)

455-R. Fighting Marine Destruction. Ray E. Heiks. *Battelle Technical Review,* v. 1, Aug. 1952, p. 89-90.

The seriousness of the problem of marine destruction and latest method employed to combat it. Use of paint coatings for corrosion prevention; also use of corrosion resistant alloys. (R1, L26)

456-R. Hastelloy Alloy D. Edward D. Weisert. *Chemical Engineering,* v. 59, Aug. 1952, p. 258, 260, 262, 264, 266-267.

Resistance of this Ni-Si-Cu alloy to a number of corrosives, with data on mechanical properties and applications in the chemical process industries. Charts show corro-

sive effects of a wide variety of common chemicals.
(R general, Q general, T29, Ni)

457-R. The Protective Properties of the Natural Oxide Film on Aluminium. J. M. Bryan. *Chemistry & Industry,* Aug. 23, 1952, p. 820-822.

Behavior under immersed conditions, reaction with water, factors influencing corrosion, galvanic action, and corrosion by food products. 38 ref. (R1, Al)

458-R. Technical Practices Committee. I. Corrosion in Oil and Gas Well Equipment. H. L. Bilhartz. *Corrosion* (Technical Section), v. 8, Sept. 1952, p. 293-295.

Origin, accomplishments, and membership of above organization. (R general)

459-R. Corrosion Control in Gas-Lift Wells. D. A. Shock and J. D. Sudbury. *Corrosion* (Technical Section), v. 8, Sept. 1952, p. 296-299.

A study based on South Texas oil fields where severe corrosion was found although producing pressures were not abnormally high. (R7, ST)

460-R. Potential Measurements in Cathodic Protection Designs. Robert P. Howell. *Corrosion* (Technical Section), v. 8, Sept. 1952, p. 300-304.

Four criteria for determining effective cathodic protection: current density, potential change, current-potential curves, and $CuSO_4$ potential. Methods, instruments, techniques, and examples of potential measurements. Multiple-rectifier systems, pipelines in salt water, steel structures in salt water, and oil and gas well casings. 10 ref. (R10, ST)

461-R. The Role of Oxygen in Corrosion and Cathodic Protection. Roy V. Comeaux. *Corrosion* (Technical Section), v. 8, Sept. 1952, p. 305-309; disc., p. 310.

Practical application of cathodic protection to the underground lines and tank bottoms in Baytown, Texas, refinery of Humble Oil and Refining Co. (R10, ST)

462-R. Cathodic Protection at Steam-Electric Generating Stations. J. H. Collins and E. H. Thalmann. *Corrosion* (Technical Section), v. 8, Sept. 1952, p. 314-320.

Corrosion of underground structures, applications of cathodic protection, and testing procedures. (R10, ST)

463-R. Corrosion Resistance and Protective Systems or Coatings for Magnesium Alloys. Hugo A. Barbian. *Engineer Research and Development Laboratories* (Ft. Belvoir, Va.), "The Magnesium Symposium," Feb. 9, 1951, p. 37-57.

Includes graphs, tables, and illustrations. (R general, L general, Mg)

464-R. Reduction of Wear and Corrosion by Suitable Design and Choice of Materials. O. Niezoldi. *Engineers' Digest,* v. 13, Aug. 1952, p. 245-246. (Translated and condensed from *Konstruktion,* v. 4, p. 145-148.)

Diagrams illustrate miscellaneous pieces of machinery. (R general, Q9)

465-R. Role of Crystal Orientation in the Oxidation of Iron. Earl A. Gulbransen and Roswell Ruka. *Journal of the Electrochemical Society,* v. 99, Sept. 1952, p. 360-368.

Results of experiments using the electron-diffraction high-temperature camera for the oxidation of single crystals of Fe as related to the process of oxidation and corrosion. Photographs and tables. 32 ref. (R2, M26, Fe)

466-R. Some Factors Affecting the Resistance of Austenitic Chromium-Nickel Steels to Attack by Hot Concentrated Nitric Acid. H. T. Shirley and J. E. Truman. *Journal of the Iron and Steel Institute,* v. 171, Aug. 1952, p. 354-358.

Behavior of high-alloy Cr-Ni steels in conc. HNO_3. Certain factors which influence the resistance of normally heat treated unwelded 18-13-1 Cr-Ni-Nb type steel to boiling 70% HNO_3. Graphs, tables, photomicrographs. (R6, SS)

467-R. A Generalized View of the Scaling Behavior of Metals. James T. Waber. *Metal Progress,* v. 62, Sept. 1952, p. 76-80.

Mathematical growth laws and the Pilling-Bedworth ratio. Graphs and tables give results of scaling experiments with various metals. (R2)

468-R. Cavitation Research. *Metal Progress,* v. 62, Sept. 1952, p. 156, 158-159. (Condensed from "Accelerated Cavitation Research", W. J. Rheingans, *Transactions of the American Society of Mechanical Engineers).*

Previously abstracted from original. See item 277-R, 1950. (R2)

469-R. Water Heater Corrosion Studies. Roy E. Dodson, Jr. *Water and Sewage Works,* v. 99, Sept. 1952, p. 345-349.

Methods of carrying out the studies, and tabulated results. Tables and photographs. (R4, CI, Zn)

470-R. Making the Ocean a Test Tube. H. C. Phelps. *Welding Engineer,* v. 37, Sept. 1952, p. 32-34, 48.

Effects of sea spray, sea air, and immersion are being studied for various metals and alloys at marine corrosion testing stations along the

North Carolina coast. Facilities and procedures. (R4)

471-R. Intergranular Corrosion in Austenitic Stainless and Acid Resisting Steels and Methods for Determination of Sensitivity to This Corrosion. Bo Hermelin. 4th International Mechanical Engineering Congress, June 1952, 16 pages.

The intergranular corrosion problem and methods for decreasing susceptibility to this defect. Compares existing test methods for susceptibility to this form of corrosion and otherwise lays the groundwork for a new method suitable for steels intended for welded application. Photomicrographs and diagrams. 25 ref. (R2, SS, SG-g)

472-R. (German.) Testing of Corrosion-Protective Wrappings by Electric Measurements. Willi Willing. *Gas- und Wasserfach,* v. 93, Aug. 1, 1952, p. 434-437.

Proposes measurement of electric resistance of wrappings in order to indicate their corrosion-protective properties. Three types of wrappings were investigated, those adhering to the metal without application of heat, those requiring heating during application, and a combination of the two types. (R11, L26)

473-R. (Russian.) A General Theory of Electrochemical Corrosion Prevention. G. A. Akimov. *Doklady Akademii Nauk SSSR,* new ser., v. 84, June 1, 1952, p. 745-748.

Discussion clarified by diagrams and graphs. (R1)

474-R. (Russian.) The Inhibition of the Solution of Copper in Nitric Acid. S. A. Balezin and G. S. Parfenov. *Doklady Akademii Nauk SSSR,* new ser., v. 85, July 1, 1952, p. 133-136.

Sodium sulfide, sodium sulfite, sodium thiosulfate, urea, thiourea, potassium permanganate, potassium chlorate, and hydrogen peroxide were tested as inhibitors. Effects of composition and temperature were determined. Data are tabulated and charted. (R10, Cu)

475-R. Design Considerations for Heat and Corrosion-Resistant Castings. E. A. Schoefer. *Machine Design,* v. 24, Sept. 1952, p. 148-154.

Differentiation between low, high, and superalloys. Includes comprehensive table of room-temperature mechanical properties. Main groups are low-alloy and stainless steels, and special alloys (Co-and Ni-base). (R general, Q general, AY, SS, SG-g, h)

476-R. Sweet Oil Well Corrosion. H. L. Bilhartz. *Petroleum Engineer,* v. 24, Sept. 1952, p. B78, B82, B87-B88.

See abstract from *World Oil;* item 198-R, 1952. (R7, ST, Ni, Zn)

477-R. Soil Resistivity Instruments and Measurements. O. W. Wade. *Pipe Line News,* Sept. 1952, p. 38-39.

Discussion to aid in pipe-line corrosion control programs and in selection of methods and instruments for measuring soil resistivity. (R8)

478-R. Corrosion. 8. Vapour Phase Inhibitors. H. L. Bennister. *Research,* v. 5, Sept. 1952, p. 424-432.

Vapor-phase corrosion inhibitors need not be in direct contact with the surface to be protected, but can exert their influence over a distance in space. They may be used in powder form, solution, or coated on paper; for the preservation of the interior of engines and similar machines, and of packaged equipment. 17 ref. (R10)

479-R. Some Corrosion Problems of Copper Alloys of Special Interest to Workshops. E. Börje Bergsman and Göte Renman. 4th International Mechanical Engineering Congress, June 1952, 6 pages.

Examples of corrosion attacks that have occurred in the workshop, classified under the headings of tarnishing and oxidation, galvanic corrosion, stress-corrosion, and dezincification. (R1, R2, Cu)

480-R. Stress-Corrosion in Special Copper-Alloys. O. Lissner. 4th International Mechanical Engineering Congress, June 1952, 18 pages.

Fourteen different Cu alloys were subjected to a test method for rapidly determining resistance to stress-corrosion by using test rods immersed in normal ammonia solution at 80° C. Effects of shape of test piece and stresses. Photomicrographs showing structure; stress-corrosion cracks, tables, and graphs. 18 ref. (R1, Cu)

481-R. (German.) Rust Prevention. Otto Gerhardt. *Werkstoffe und Korrosion,* v. 3, Aug. 1952. p. 294-299.

Use of Al bronze as an anticorrosive paint in southern climates. Critical discussion by Willi Machu and by Fritz Todt is appended. 32 ref. (R10, L26, Fe)

482-R. (Book) Corrosion Testing Procedures. F. A. Champion. 369 pages. John Wiley & Sons, 440 4th Ave., New York 16, N. Y. $6.25.

Five distinct steps in corrosion testing procedure: Choice and preparation of metal and corrosive; exposure of the metal to laboratory or field environment; cleaning of the specimens preparatory to examining; examination of the specimens and corrosive; and expression and

interpretation of results, with particular reference to form of the corrosion-time curve. Detailed ref. (R11)

483-R. (Book.) **An Engineer's Approach to Corrosion.** C. F. Trigg. 133 pages. 1952. Sir Isaac Pitman & Sons, Ltd., 39 Parker St., Kingsway, London W.C.2, England. 15s.

Chapters are devoted to classification and importance of corrosion; mechanism; corrosion under special conditions; effects; prevention; permanent and temporary protective treatments. A variety of metallic and nonmetallic materials are covered. (R general)

484-R. Grease Feedability Reduces Fretting Corrosion. *Aviation Age,* v. 18, Sept. 1952, p. 6-16.

A study of effect of soap base, consistency, and additives on minimizing fretting corrosion. Li, Na, Na-Ca, and Ca soaps were used on ball thrust bearings in a special friction oxidation tester. Includes literature survey. Tables and photographs. 20 ref. (R1)

485-R. Corrosion Inhibitor Checklist. Maxey Brooke. *Chemical Engineering,* v. 59, Sept. 1952, p. 286-287.

Representative liquids and the following metals: Al, Cu, brass, Mg, steel, Monel, and Sn plate. 41 ref. (R10, Al, Cu, Mg, ST, SS, Ni)

486-R. More About Applications of New Chrome Carbides. *Chemical Engineering,* v. 59, Sept. 1952, p. 288, 290, 292.

Briefly compares above with tungsten carbide and steels with emphasis on corrosion resistance. (R general, T general, Cr, C-n, W, ST)

487-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 44, Sept. 1952, p. 101A-102A, 104A.

Methods and techniques for determining the erosion-corrosion resistance of metals and alloys. (R1)

488-R. Metallic Corrosion Influenced by Ultrasonic Waves. Shigeto Yamaguchi. *Journal of Applied Physics,* v. 23, Sept. 1952, p. 1057-1058.

Ultrasonic waves were employed to stir the corroding solution in which immersion tests were carried out. From results obtained, the wet corrosion of metals was more reasonably elucidated by colloid science than by oxide film theory. Mg was the test metal. (R11, Mg)

489-R. High Temperature Oxidation of Some Iron-Chromium Alloys. D. Caplan and M. Cohen. *Journal of Metals,* v. 4, Oct. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 1057-1065.

The scaling characteristics of three Fe-Cr alloys were investigated by determining their weight gain vs. time curves at 1600-2000° F. Scales formed were examined using techniques of X-ray diffraction and spectrographic and metallographic analysis in an attempt to explain discontinuities in curves and to elucidate mechanism of scaling. Graphs, tables, and micrographs. 33 ref. (R2, Fe, Cr)

490-R. The Behaviour of Stranded Aluminium Conductors in Marine Atmospheres. F. A. Champion and E. W. Skerrey. *Light Metals,* v. 15, Sept. 1952, p. 286-290.

Investigation in reference to their resistance to corrosion. Tests of Al, Cu, and Zn coatings on steel cores were conducted. Tables and diagrams. (R3, Al, Cu, Zn, ST)

491-R. Some Problems of Corrosion in the Steel Industry. Herbert L. Coe. *Steel Equipment & Maintenance News,* v. 5, Sept. 1952, p. 9-12.

Types of corrosion, its control, and special problems in steel structures, roofing and siding, tanks, pipe lines, fittings. Mention of corrosion in masonry structures. (R general, ST, CN)

492-R. Material Problems in Chemical Process Equipment. L. Piatti. *Sulzer Technical Review,* no. 1, 1952, p. 21-34.

See abstract of article of similar title from *Schweizer archiv für angewandte Wissenschaft und Technik,* item 209-R, 1951. (R1, R2, T29, ST)

493-R. Utilization of Low-Grade Coals for Power Generation. Richard C. Corey and James W. Myers. *Combustion,* v. 24, Sept. 1952, p. 43-48.

Effects on over-all boiler performance of ash content, ash fusibility, coal-swelling properties, sulfur content, moisture, and grindability. Brief mention of corrosion and erosion. (R7)

494-R. Stress Corrosion Cracking of Steel Under Sulfide Conditions. C. N. Bowers, W. J. McGuire, and A. E. Wiehe. *Corrosion,* v. 8, Oct. 1952, p. 333-340; disc., p. 357-360.

Laboratory and field study. Data on stainless, carbon, and alloy steels, Monel and Inconel. Metallographic results. Recommendations on necessary mechanical properties. Theory. Diagram, tables, and photomicrographs. (R1, SS, CN, AY, Ni)

495-R. Cracking of High Strength Steels in Hydrogen Sulfide Solutions. J. P. Fraser and R. S. Treseder. *Corrosion,* v. 8, Oct. 1952, p. 342-350; disc., p. 357-360.

Laboratory data relating to spontaneous cracking and embrittlement

of steel alloys under environmental and stress conditions pertinent to sour gas condensate wells. Composition and heat treatment of alloy, type and magnitude of stress, composition of corrosive solution, composition and pressure of gas environment, temperature, and time of exposure. Besides steel, data are given for Monels and Stellites. Proposed explanation involves stress-corrosion cracking and hydrogen embrittlement. Tables, micrographs, and photographs.
(R1, Q23, SS, AY, CN, Ni, Co)

496-R. Field Experience With Cracking of High Strength Steels in Sour Gas and Oil Wells. *Corrosion*, v. 8, Oct. 1952, p. 351-354; disc., p. 357-360.

Report on accumulated field experience with corrosion cracking of oil well tubular goods and wellhead fittings in sour gas and oil wells. Descriptions of failed tubing, casing, and wellhead fittings. Data obtained from stressed specimens of various alloys placed in flowlines of wells in several fields. Possible remedial measures. Corrosion type is not known. (R1, SS, AY, CN)

497-R. Corrosion Control by Magic —It's Wonderful. H. H. Uhlig. *Corrosion*, v. 8, Oct. 1952, p. 361-363.

Examples of fraudulent practices of corrosion prevention; ways to evaluate new ideas in order to weed out superstition, witchcraft, dishonesty, and reactionary ideas. (R10)

498-R. Reaction Between Ferrous Iron and Dissolved Oxygen in Brine. D. C. Bond and G. G. Bernard. *Industrial and Engineering Chemistry*, v. 44, Oct. 1952, p. 2435-2438.

Apparatus and procedure. Data of importance in oil field technology, corrosion, etc. Graphs. 23 ref. (R7)

499-R. Oxidation Products Which Contribute to the Oxidation Resistance of TiC-Base Cermets. Harold M. Greenhouse. *Journal of the American Ceramic Society*, v. 35, Oct. 1, 1952, p. 271-274.

How to minimize oxidation of TiC cermets by curtailing two types of diffusion processes. This may be done by formtion of an amorphous glassy oxide and formation of oxidation products which enable certain types of crystalline oxides to occur in a definite order. Both these methods are discussed by means of representative examples.
(R2, Ti, C-n)

500-R. Theoretical Analysis of the Diffusion Processes Determining the Oxidation Rate of Alloys. Carl Wagner. *Journal of the Electrochemical Society*, v. 99, Oct. 1952, p. 369-380.

Oxidation rate of alloys containing a noble metal (Au or Pt) and an oxidizable metal (Ni, Cu, or Zn) is calculated as a function of alloy composition. Graphs and tables. 47 ref.
(R2, N1, Ni, Cu, Zn, Au, Pt, EG-c)

501-R. Corrosion of Aluminum by Carbon Tetrachloride. Milton Stern and Herbert H. Uhlig. *Journal of the Electrochemical Society*, v. 99, Oct. 1952, p. 381-388.

Quantitative effects of moisture, dissolved gases, and impurities in CCl_4, and effects of impurities and alloying constituents in Al. Serves as a basis for better understanding of the mechanism of reaction of Al with chlorinated organic solvents. Diagrams, graphs, and tables. 14 ref. (R7, Al)

502-R. Effect of Oxide Films on the Reaction of Aluminum With Carbon Tetrachloride. Milton Stern and Herbert H. Uhlig. *Journal of the Electrochemical Society*, v. 99, Oct. 1952, p. 389-392.

Describes experiments. Tables, graphs, and photographs. (R7, Al)

503-R. Electron Diffraction Studies on the Oxidation of Pure Copper and Pure Zinc Between 200° and 500° C. E. A. Gulbransen and W. R. McMillan. *Journal of the Electrochemical Society*, v. 99, Oct. 1952, p. 393-401.

A study of crystal structures of oxide films on pure Cu and pure Zn, a proposed intermediate oxide, a proposed pseudomorphic oxide of Zn, and of mechanism of low-temperature oxidation of Cu. Tables. 37 ref. (R2, M22, Cu, Zn)

504-R. A Preliminary Study of the Oxidation and Vapor Pressure of Chromium. E. A. Gulbransen and K. F. Andrew. *Journal of the Electrochemical Society*, v. 99, Oct. 1952, p. 402-406.

A report of reactions of Cr with O_2 at 7.6 cm. Hg and 700-900° C., as well as high-temperature reactions of Cr in high vacua. Graphs and tables. 22 ref. (R2, P12, Cr)

505-R. Measurement of the Corrosion Rate of a Metal From Its Polarizing Characteristics. W. J. Schwerdtfeger and O. N. McDorman. *Journal of the Electrochemical Society*, v. 99, Oct. 1952, p. 407-413.

Theoretical electrical relations between polarizing characteristics of elements of a galvanic couple and polarizing characteristics of the couple itself. Experimental demonstration by means of steel surfaces. Tables and graphs. 15 ref. (R11, ST)

506-R. A Polarographic Study of the Influence of Temperature on the Rate of Oxygen Consumption by Iron, Lead, and Zinc. Paul Delahay, Clarence F. Pillon, Jr., and Douglas Perry. *Journal of the Electrochemical Society*, v. 99, Oct. 1952, p. 414-416.

Determined in an acetate buffer of pH 5.0 at various temperatures. Experimental data were analyzed by assuming that over-all rate of oxygen reduction is controlled by rate of chemical reaction and by diffusion of oxygen toward the metal surface. Graphs. 11 ref. (R11, Fe, Pb, Zn)

507-R. Passivity of Titanium in Hydrochloric Acid Solutions. David Schlain and Joseph S. Smarko. *Journal of the Electrochemical Society,* v. 99, Oct. 1952, p. 417-422.

Study of the effect of air and various metal ions on electrode potentials and corrosion rates of Ti in various concentrations of HCl at room temperature. Graphs and tables. 14 ref. (R10, Ti)

508-R. Inorganic Corrosion Inhibitors in Acid Solution. Cecil V. King, Emil Goldschmidt, and Natalie Mayer. *Journal of the Electrochemical Society,* v. 99, Oct. 1952, p. 423-426.

In dilute HCl with excess KNO_3 as a depolarizer, Fe, Zn, and Cd dissolve at, or nearly at, a maximum rate controlled by rate of convection and speed of diffusion of hydrogen ions. Tables. 14 ref. (R10, Fe, Zn, Cd)

509-R. High-Temperature Corrosion Rates of Several Metals With Hydrogen Sulfide and Sulfur Dioxide. Milton Farber and Donald M. Ehrenberg. *Journal of the Electrochemical Society,* v. 99, Oct. 1952, p. 427-434.

Corrosion rates at temperatures above 1000° K. were determined for several metals including Cu, Ag, Inconel, Ni, 18-8 stainless steel, Fe, W, and Ta in atmospheres of H_2S, SO_2, and CO_2. Diagrams, graphs, and micrographs. 22 ref. (R9, Cu, Ag, Ni, Fe, W, Mo, Ta)

510-R. A Practical Evalution of Metallic Coatings as Affecting Sensitivity to Stress-Corrosion Failure. C. H. Hannon. *Metal Finishing,* v. 50, Oct. 1952, p. 65-66, 71.

Results of tests in which Cu eyebolts with metallic coatings of Cu+Ni+Cr, Cu+Ni+Sn, Cu+Ag, Cu+Sn, Ni−Sn, and single electroplates of Ag, Cd, and Sn were tested to evaluate stress-corrosion. (R11, R1, Cu, Ni, Cr, Sn, Ag, Cd)

511-R. Incipient Corrosion of Steel: Study of Its Initiation and Progress. F. Hargreaves. *Metal Treatment and Drop Forging,* v. 1, Sept. 1952, p. 385-390.

Study in which filiform corrosion was induced in a polished steel specimen and its growth traced. Effect of nonmetallic inclusions and droplets of various liquids, and influence of surface protectives. Micrographs. (R1, R11, ST)

512-R. Corrosion Factors in Design and Lubrication. *Product Engineering,* v. 23, Oct. 1952, p. 142-147.

Design and lubrication are the two major fields into which many of the variables fall that are conducive to corrosion. Diagrams, tables, and photographs give specific information for many metals, alloys, and lubricants. (R7)

513-R. Corrosion Studies and the Use of Stainless Steel at the Back River Sewage Treatment Works, Baltimore, Md. C. E. Keefer and Kenneth M. Huston. *Sewage and Industrial Wastes,* v. 24, Oct. 1952, p. 1209-1220.

Corrosion tests on stainless steel, Al, Ni, alloys, Cu, cast and wrought irons, and mild steel. Plant-scale experience with stainless steel in primary settling tanks, in ferrous sulfate chlorinating tanks, in downspouts and gutters, in centrifugal sludge pump, and in vacuum filters. Effect of mechanical properties, and applications for stainless steel. Photographs and tables. (R4, T4, SS, Al, Ni, Cu, CN, CI)

514-R. Engine Lubricating Oils; the Performance of Premium and Heavy-Duty Qualities. J. G. Withers. *Automobile Engineer,* v. 42, Oct. 1952, p. 387-393.

Basic functions and various types of oils. Includes engine wear and corrosion of bearing alloys. 10 ref. (R7, Q9, SG-c)

515-R. Corrosion of Metals. An Historical Treatment of the Subject. U. R. Evans. *Chemistry & Industry,* Oct. 11, 1952, p. 986-993.

Corrosion of nonferrous metals and iron in early times, early views of electrochemical mechanisms, corrosion of two metals in contact and of single metals, measurement of corrosion currents, corrosion probability and rate oxidation, tarnishing, atmospheric corrosion, corrosion fatigue, stress corrosion, inhibitive water treatment, cathodic protection, and protective coatings. 11 ref. (R general, L general, A2)

516-R. Studies in the Corrosion of Metals Occasioned by Aqueous Solutions of Some Surface-Active Agents. II. Mild Steel. T. K. Ross and H. Holness. **III. Tin.** T. K. Ross. *Journal of Applied Chemistry,* v. 2, Sept. 1952, p. 520-531.

Action of dilute aqueous solutions of representative anionic, cationic, and nonionic wetting agents on mild steel sheet and sheet tin. Results expressed graphically. 11 ref. (R5, P10, CN, Sn)

517-R. The Stress-Corrosion Cracking of Mild Steels in Nitrate Solution. R. N. Parkins. *Journal of the Iron and*

Steel Institute, v. 172, Oct. 1952, p. 149-162.

Reason for formation of intergranular macro-cracks in mild steels subject to static stress and corrosive environment of a boiling Ca-ammonium nitrate solution. Significance of the work is the relationship between carbide distribution in material and its tendency to this type of failure. A further relationship is indicated between lattice distortion of grains and a tendency to stress-corrode. Results indicate that susceptible mild steels have an almost continuous film of distorted ferrite in the grain-boundary region. Suggests theory that this distortion is sufficient to make boundary regions anodic to rest of the grain. Graphs, photomicrographs, and tables. 31 ref. (R1, CN)

518-R. Corrosion of Alkaline Pulping Digesters: Analysis of Corrosion Questionnaires. R. S. Peoples and G. L. Ericson. *Tappi,* v. 35, Sept. 1952, p. 403-409.

Tabulates results of extensive questionnaire sent to kraft and soda pulp mills in the U. S., Canada, and Australia. Additional work and tests are suggested. (R5, ST)

519-R. Surface Corrosion of Heat-Resisting Materials Under the Action of Bunker Oil Ashes Containing Sodium, Sulphur and Vanadium. F. Gallmann, J. Friedli, and W. Epprecht. *Third World Petroleum Congress, Proceedings,* sec. VIII, 1951, p. 32-43; disc., p. 43-49.

A study at 650° C. to determine also whether internal structural changes occur. Four commercial heat resisting alloys were used, one Ni-base and the rest stainless steels. Microscopic and X-ray data. Information on recrystallization. Photomicrographs, X-ray photographs, and tables.
(R7, M27, N5, SS, Ni, SG-h)

520-R. (French.) **Anticorrosive Protection of Underground Pipe and Surveying the Terrain.** A. J. Maurin. *Third World Petroleum Congress, Proceedings,* sec. VIII, 1951, p. 50-70; disc., p. 76-78.

A special technique based on study of some 5000 km. of all types of pipelines and installation of cathodic protection on about 1000 km. Includes data for steel, iron, and Pb. Circuit and other diagrams, and elaborate reference and calculation charts. 10 ref. (R10, ST, Pb)

521-R. Mitigation of Corrosion Within Carbon Compartment Aboard a T-2 Tanker. G. D. Harden. *Third World Petroleum Congress, Proceedings,* sec. VIII, 1951, p. 79-85; disc., p. 95-96.

Application and results of anti-corrosion system for tankers in refined petroleum service. It consists of galvanic protection plus chemical inhibition. (R7, R10, ST)

522-R. Rust-Inhibited Distillate Fuels. F. M. Watkins. *Third World Petroleum Congress, Proceedings,* sec. VIII, 1951, p. 86-95; disc., p. 95-96.

Properties and performance of a commercial rust inhibitor developed to prevent internal corrosion in industrial equipment, automobile parts, etc., which are in contact with distillate fuels. (R7, R10)

523-R. (French.) **Safety and Economy in the Protection of Subterranean Steel Pipelines.** O. L. Bihet and H. Goldstein. *Third World Petroleum Congress, Proceedings,* sec. VIII, 1951, p. 71-76; disc., p. 76-78.

Protective system extensively used in Western Europe consists of a modified bitumen coating in conjunction with cathodic protection. Tables. (R10, L26, ST)

524-R. The Corrosion Problem in Sewage and Waste Treatment. John J. Baffa. *Water & Sewage Works,* v. 99, Oct. 1952, p. 399-401.

Corrosive influences, bacteria and corrosion, and hot-water corrosion. (R4)

525-R. Sewage Corrosion Control at New York City Treatment Plants. Richard C. French. *Water & Sewage Works,* v. 99, Oct. 1952, p. 402-406.

Painting and replacing parts with newer alloys are suggested for controlling corrosion. (R4, ST)

526-R. Corrosion of Structural Spot Welds. B. Karnisky, E. Kinelski, and E. Gruca. *Welding Journal,* v. 31, Oct. 1952, p. 903-916.

Investigation of corrosion phenomena in spot welded joints in low-alloy, high-strength steel plus an evaluation of beneficial effects of protective weld sealers. Results are tabulated; macrographs and micrographs. (R general, K3, AY)

527-R. (French.) **Research on the Mechanism of Oxidation of Iron Monocrystals.** Jean Bardolle and Jacques Benard. *Revue de Métallurgie,* v. 49, Sept. 1952, p. 613-621; disc., p. 621-622.

Experimental investigations on the above under various oxygen pressures and at different temperatures. Preparation of test specimens and results. Micrographs. 15 ref. (R2, Fe)

528-R. (French.) **Passivity of Stainless Steels in an Acid Medium.** J. M. Defranoux. *Revue de Métallurgie,* v. 49, Sept. 1952, p. 664-672.

The rate of corrosion and special types of corrosion corresponding to a very high metal-solution potential

were investigated. Progressive establishment of passivity of stainless steels in a strong-acid medium, and the mechanism of the process. Diagrams. 13 ref. (R10, SS)

529-R. (Russian.) Inhibition of Corrosion of Nitrided Steel in Sulfuric Acid. S. A. Balezin and V. B. Ratinov. *Doklady Akademii Nauk SSSR,* new ser., v. 85, July 11, 1952, p. 367-368.

The kinetics of the solution of nitrided layers and the inhibition of corrosion. Data are tabulated and charted. (R10, ST)

530-R. (Russian.) The Structure of Copper Scale and the Mechanism of the Oxidation of Copper. N. P. Diev and M. I. Kochnev. *Doklady Akademii Nauk SSSR,* new ser., v. 85, July 21, 1951, p. 563-566.

An experimental study. 11 ref. (R2, Cu)

531-R. Reducing Return Line Corrosion by New Makeup Treatment. F. N. Kemmer and N. C. Stratton. *Heating and Ventilating,* v. 49, Nov. 1952, p. 105-107.

Theory of process involving reduction of make-up alkalinity through anion exchange. An example of pratical application of method. (R10)

532-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 44, Nov. 1952, p. 101A-102A, 104A.

Summarizes in chart form corrosion of 18-8S steel by HNO_3 as a function of temperature. (R5, SS)

533-R. Effect of Corrosion and Growth on the Life of Positive Grids in the Lead-Acid Cell. J. J. Lander. *Journal of the Electrochemical Society,* v. 99, Nov. 1952, p. 467-473.

Corrosion and growth of several binary and ternary Pb alloys were measured under various conditions. It was found that Sn additions have a positive effect in slowing corrosion rates and that small amounts of a third element may be added to increase tensile strength without increasing corrosion rates. An empirical relationship between growth and tensile strength is shown. Tables and graphs. (R5, Q27, Pb)

534-R. The Passivity of Metals. Part XI. The Anodic Behaviour of Iron Oxide Films. U. R. Evans and I. D. G. Berwick. *Journal of the Chemical Society,* Sept. 1952, p. 3432-3437.

Study made of behavior of iron, coated with a visible oxide film by previous heating in air, when subjected to anodic treatment in dilute H_2SO_4. Measurements were made of time needed for destruction of oxide film by auto-reduction after interruption of current. Diagrams and graphs. (R10, Fe)

535-R. (German.) Borderline Cases of Corrosion of Stainless Steels. Luigi Piatti. *Werkstoffe und Korrosion,* v. 3, Sept.-Oct. 1952, p. 325-328.

Corrosion experiments destined to determine suitability of materials for use in the chemical industry. Results of tests are interpreted. Micrographs. (R11, T29, SS)

536-R. A Metallographic Study of Pitting Corrosion Induced in 2S Aluminum Alloy by Exposure to Tap Water. E. C. Pearson, H. J. Huff, and R. H. Hay. *Canadian Journal of Technology,* v. 30, Oct.-Nov. 1952, p. 311-316.

Samples of above alloy, in both the fully work hardened and annealed states, were examined under the conventional light microscope and electron microscope after exposure to pitting corrosion conditions in tap water for periods of 15 min., 24 hr., and 10 weeks. Prior to exposure all sample panels received a uniform pretreatment designed to bring the panel surfaces into the same initial condition. Typical photomicrographs show variation observed in pit structure with time of exposure and with metallurgical condition. 17 ref. (R11, Al)

537-R. Corrosion Due to Tuberculation in Water Systems. I. The Effect of Calgon on the Potential of Iron Electrodes in Differential Aeration Cells With Running Tap Water. II. The Effect of Calgon on the Potential of Zinc and Copper Electrodes in Differential Aeration Cells With Running Tap Water. J. L. Mansa and Waclaw Szygalski. *Corrosion* (Technical Section), v. 8, Nov. 1952, p. 381-390.

Graphs and diagrams. 30 ref. (R4, P15, Fe, Zn, Cu)

538-R. Potential and Current Requirements for the Cathodic Protection of Steel in Soils. W. J. Schwerdtfeger and O. N. McDorman. *Corrosion* (Technical Section), v. 8, Nov. 1952, p. 391-398; disc., p. 398-399.

Potentials of steel in 20 airfree soils varying in pH from 2.9 to 9.6 were determined in the laboratory. These data and potential-pH relation for hydrogen electrode were used in fixing optimum potential for cathodic protection of steel against corrosion. Cathodic polarization curves are interpreted in terms of above potential and current requirements for cathodic protection of steel in soils. Tables, graphs, diagrams, and photographs. 15 ref. (R10, ST)

539-R. Converting to Non-Nickel Stainless Steel. Parts I and II. Richard E. Paret. *Electrical Manufacturing,* v. 50, Oct. 1952, p. 112-115, 342, 344, 346; Nov. 1952, p. 137-141, 330, 332, 334.

Part I: Comparative data on corrosion resistance and mechanical properties of Cr stainless steel. Part II: Design problems faced in changing from 18-8 stainless to the more readily available Type 430 which arise from differences in fabricating characteristics. Tables. (To be concluded.)
(R general, Q general, SS)

540-R. Pump Materials That Can Reduce Corrosion. R. J. MacMeekin. *Industry and Power,* v. 63, Nov. 1952, p. 97-98.

Characteristics of various metals, and combinations applicable for special conditions met in actual operation. Table. (R4, SG-g)

541-R. The Cause of the Chemical Resistance of Stainless Steel. I. D. G. Berwick and U. R. Evans. *Journal of Applied Chemistry,* v. 2, Oct. 1952, p. 576-590.

Influence of anodic and cathodic treatment; corrosion rates and potentials in aerated and de-aerated acid; times of activation on replacing oxygen by inert gas; times of passivation on replacing inert gas by oxygen; and effect of connection with an external aerated cathode. Tables, graphs, and diagrams. 30 ref. (R10, SS)

542-R. Scaling of Lead in Air. Elmer Weber and W. M. Baldwin, Jr. *Journal of Metals,* v. 4, Aug. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, 854-859.

Solid Pb obeys a single parabolic weight increase vs. time law. In contrast, liquid Pb undergoes three successive parabolic weight increase vs. time laws, first of which has a law constant relative to latter two. Conversion times for change from one parabola to the next decrease with increasing temperature. Graphs. 18 ref. (R2, Pb)

543-R. Role of Corrosion in Engine Wear. J. C. Geniesse and H. R. Jackson. *Petroleum Processing,* v. 7, Nov. 1952, p. 1620-1622.

Reviews work of various investigators to show influence of low-temperature operating conditions and sulfur content of fuels on wear of cylinder walls and piston rings. Jacket temperature, oil, cylinder-wall metallurgy, and fuels are considered. Graphs. (R7, Q9)

544-R. Dow Conquers Sea Water Corrosion. D. P. Thornton, Jr. *Petroleum Processing,* v. 7, Nov. 1952, p. 1640-1643.

Dow Chemical Co., uses water from Gulf of Mexico as a coolant and process raw material. Alloys used for various locations, corrosion-preventive coatings, and cathodic protection measures. (R4)

545-R. Galvanic Corrosion of Dissimilar Metals. Part I. W. D. Mogerman. *Sheet Metal Worker,* v. 44, Nov. 1952, p. 41-43, 104.

Various examples encountered by the author and by others. Reviews principles. (To be continued.) (R1)

546-R. (Italian.) **The Protection of Stainless Steels Against "Pitting" in a Saline Medium.** L. Cavallaro and C. Bighi. *Metallurgia Italiana,* v. 44, Aug.-Sept. 1952, p. 361-365.

Protection of 18/8 austenitic steel against pitting effect of salt solutions by means of small additions of caustic soda. (R5, R10, SS)

547-R. (Italian.) **The Phenomenon of Erosion by Pitting, With Particular Regard to Tappets.** L. Locati and A. Ferro. *Metallurgia Italiana,* v. 44, Aug.-Sept. 1952, p. 448-455.

Distribution of stresses during rotation was investigated, with special regard to pitting of steel and cast iron tappet parts for internal-combustion engines. Mechanical properties of several types of carbon steel and cast iron heat treated in different ways, are tabulated.
(R2, Q general, CN, CI)

SECTION S

INSPECTION and CONTROL

1-S. Know Your Inspection Tools. H. E. Linsley. *American Machinist,* v. 95, Nov. 12, 1951, p. 147-158.

Special report on dimensional gaging equipment. (S14)

2-S. The Detection of Metallic Elements. Christin C. Miller. *Chemistry & Industry,* Oct. 6, 1951, p. 831-834.

Use of chemical methods. 31 ref. (S11)

3-S. Automatic Conveyorized Unit Used in Black-Light Inspection. *Foundry,* v. 79, Dec. 1951, p. 102-103, 225.

A specially designed automatic conveyorized Zyglo unit was installed for receiving inspection of assorted malleable and gray iron castings received at Caterpillar. (S13, CI)

4-S. Ambient Temperature Independent Thermopiles for Radiation Pyrometry. William G. Fastie. *Journal of the Optical Society of America,* v. 41, Nov. 1951, p. 823-829.

Experimental and theoretical analyses which have formed the basis for several designs for thermopiles whose voltage output is not affected by ambient temperatures below 225° F. The techniques are applicable to other types of radiation thermopiles and to bolometers, the analysis prescribing the ambient temperature limits and source temperature limits between which satisfactory performance may be anticipated. (S16)

5-S. Radioactive Materials in Industrial Metallurgy. Sheila M. Holgate. *Metallurgia,* v. 44, Oct. 1951, p. 179-184.

A brief general discussion of radioactivity followed by detailed consideration of its use in metallurgy. 45 ref. (S19)

6-S. Alpha-Particle Assay and the Measurement of the Thorium-Uranium Ratio in Radioactive Ores. D. H. Peirson. *Proceedings of the Physical Society,* v. 64, sec. B, Oct. 1, 1951, p. 876-888.

Measurement of the alpha-particle activity of a "thick" radioactive source containing the natural radioactive series. Two methods of determining the Th-U ratio are considered for use in ore or mineral assays. (S11, Th, U)

7-S. Xeroradiography Can Cut X-Ray Inspection Costs. M. D. Phillips and S. A. Wenk. *Iron Age,* v. 168, Nov. 29, 1951, p. 86-89.

Use of new dry radiographic process which has several advantages in industrial radiography. Plates are used repeatedly and are not spoiled by accidental exposure to light, X-rays, or nuclear radiation. The image may be quickly developed by a simple method and transferred to ordinary paper. (S13)

8-S. Notes on Pyrometry. Gerard M. Wolten. *Metal Progress,* v. 60, Nov. 1951, p. 91-92.

Sensing elements of temperature-measuring devices. Factors such as heat imput, heat loss, and heat exchange as affecting thermocouple determinations. Various forms of pyrometers. (S16)

9-S. Fluoroscopic Inspection of Light Metal Castings. Justin G. Schneeman and T. E. Piper. *Metal Progress,* v. 60, Nov. 1951, p. 93-96.

The major limiting factors. Safety requirements needed in use. Various applications. (S13, EG-a)

10-S. Precise Temperature Control. Charles F. Rains and Robert C. McMaster. *Electrical Manufacturing,* v. 48, Dec. 1951, p. 110-113, 250-252, 256.

Thyratron temperature regulator which provides an extremely fast and sensitive control for conduction-heating currents. Facilitates accurate control of temperature for investigating material properties at high temperatures. Diagrams and bibliography on applied electronics. (S16)

11-S. Full Analysis of Design and Service Conditions Essential in Selecting Heat Resistant Alloys. R. T. Pamment. *Western Metals,* v. 9, Nov. 1951, p. 50-51.

Principles to be applied in selection of alloys for particular applications requiring heat or corrosion resistance, or both.
(S21, T general, SG-g, h)

12-S. A.S.T.M. Specifications for Soft Solder Metal. The Melting Range of Tin-Lead Solders. *Tool Engineer,* v. 27, Dec. 1951, p. 53-54.

Tabular data.
(S22, P12, Pb, Sn, SG-f)

13-S. Statistical Quality Control of Metalworking Operations. Parts III and IV. Lester F. Spencer. *Steel Processing,* v. 37, Oct. 1951, p. 506-508; Nov. 1951, p. 567-568, 576.

Use of control charts. Advantages and disadvantages. 16 ref. (S12)

14-S. Spectrochemical Analysis of Bronze by a Porous Electrode Method. Bourdon F. Scribner and John C. Ballinger. *Journal of Research of the National Bureau of Standards,* v. 47, Oct. 1951, p. 221-226.
(S11, Cu)

15-S. Spectrophotometric Determination of Bismuth in Lead-Base and Tin-Base Alloys. Bruce B. Bendigo, Rosemond K. Bell, and Harry A. Bright. *Journal of Research of the National Bureau of Standards,* v. 47, Oct. 1951, p. 252-255.
(S11, Pb, Sn)

16-S. Recording Ultra Rapid Changes in Temperature. B. Luyet and F. Gonzales. *Refrigerating Engineering,* v. 59, Dec. 1951, p. 1191-1193, 1236.

A detecting and recording instrument used to measure a change of several hundred degrees per second. (S16)

17-S. Temperature Measurement and Control. J. L. Garrison. *Industrial Heating,* v. 18, Sept. 1951, p. 1562, 1564, 1566, 1568, 1570, 1572.

Various temperature measuring systems and equipment used in gas-fired installations. Automatic control systems used to regulate temperatures of gas-burning equipment and the selection of the proper control system for a given gas-heated process. (To be continued). (S16)

18-S. Betatron Radiography. D. G. Wyatt. *Photographic Journal,* v. 91B, Sept.-Oct. 1951, p. 102-105.

Technique used in radiographing a steel object (a lathe chuck) with 9.6 mev. betatron radiation.
(S13, ST)

19-S. Photometric Determination of Iron Traces in Zinc and Aluminium. *Chemical Age,* v. 65, Dec. 1, 1951, p. 735-738.

Effect of acid concentration and of sulfosalicylic acid content; sensitivity of the quantitative detection of Fe in solutions free from foreign salt; and effects of Zn, Al, Zn and Al contaminants. (S11, Fe, Zn, Al)

20-S. Photometric Measurement of Particle Size and Relative Surface Area. R. J. T. Charles. *Canadian Mining and Metallurgical Bulletin,* v. 44, Nov. 1951, p. 722-729; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 54, 1951, p. 452-459.

An apparatus for measuring the surface area of a few of the simple minerals with a high degree of accuracy consists essentially of a photometric device that will measure the turbidity of fine-particle suspensions. (S14)

21-S. Inorganic Chromatography on Cellulose. Part VI. The Extraction and Determination of Gold. N. F. Kember and R. A. Wells. *Analyst,* v. 76, Oct. 1951, p. 579-587.

Two chromatographic methods for the quantitative separation of gold from many other metals. Special attention is given to the separation of Au from the six Pt metals.
(S11, Au, EG-c)

22-S. A Period Immersion Pyrometer. R. F. Wright and E. Scorah. **Appendix: An Alternative Method,** T. Land and R. Barber. *Journal of the Iron and Steel Institute,* v. 169, Nov. 1951, p. 243-244.

A method of period immersion pyrometry was developed for use on high-frequency furnaces using normal types of immersion pyrometer, fitted with fused alumina dipping tubes, which are coated with alumina cement to minimize heat shock. Immersion periods of up to 2 hr. were obtained. Experiments on other uses of the technique. In the appendix, the alternative apparatus is described and diagrammed. (S16)

23-S. Pyrometers for Surface-Temperature Measurement. M. D. Drury, K. P. Perry, and T. Land. *Journal of the Iron and Steel Institute,* v. 169, Nov. 1951, p. 245-250.

Three improved pyrometers designed to measure the temperature of hot surfaces in cool surroundings, with particular reference to the requirements of the steel industry.
(S16)

24-S. Radioactive Isotopes; Some Applications in the Metal Industry. K. Fearnside. *Metal Industry,* v. 79, Nov. 16, 1951, p. 415-418.

Various examples to show the wide range of problems that can be tackled by the use of radioactive isotopes. (S19)

25-S. The Spectrographic Determination of Alumina in Silica Brick. W. S. Sykes and D. Manterfield. *Metallurgia,* v. 44, Oct. 1951, p. 267-270.

A simple method of determining the Al content of silica bricks by spectrographic means, having an accuracy of the order of ±0.05% Al. The method may also have possibilities for use in spectrographic analysis of other oxide-bearing materials such as slags. (S11)

26-S. The Determination of Iron, Nickel and Manganese in Copper Base Alloys. G. W. C. Milner and H. Groom. *Metallurgia,* v. 44, Oct. 1951, p. 271-275.

Absorptiometric methods for the individual determination of Fe, Ni, and Mn in most types of Cu-base alloys. A composite scheme for determination of these elements from a single sample weight which is advantageous for alloys requiring determination of all three elements. (S11, Cu)

27-S. Magnetically-Operated Temperature-Detection Switch. *Engineering,* v. 172, Nov. 23, 1951, p. 671.

Device employs a fixed temperature-sensing element held in contact with a permanent magnet by mutual attraction. (S16)

28-S. Review of Present-Day Steelfoundry Radiographic Practice. G. M. Michie. *Foundry Trade Journal,* v. 91, Nov. 29, 1951, p. 615-624; disc., p. 624-626.

Development and present status with emphasis on safety precautions and on the wider application of the process made possible by the availability of cheap radioactive isotopes. (S13, S19, CI)

29-S. Measuring the Thickness of Layers or Thin Films. (In French.) Rudolf Berthold. *Metaux: Corrosion—Industries,* v. 26, Sept. 1951, p. 369-374.

Measurement of thin films and sheets up to 1 mm. thick, linings over 1 mm. thick, and ferromagnetic and non-ferromagnetic layers. (S14)

30-S. Spectrochemical Analysis of Steelmaking Slags; Preparation of Synthetic Standards by Sintering. (In French.) René Castro and René Loude. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 233, Oct. 29, 1951, p. 1031-1033.

Rapid and accurate techniques for analysis of various types of the slags containing 30-70% CaO; up to 50% Al_2O_3; 20-30% SiO_2, FeO, Cr_2O_3, or MgO; and a few per cent of TiO_2 or MnO_2. (S11)

31-S. Determination of Traces of Sodium, Copper, and Rare Earths in High-Purity Aluminum by the Pile-Activation Method. (In French.) Philippe Albert, Michel Caron, and Georges Chaudron. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 233, Nov. 5, 1951, p. 1108-1110.

Development of procedure in which the specimens are exposed in an atomic pile. The formation of radioactive isotopes of trace impurities makes possible determination of the amounts present. (S11, S19, Al)

32-S. Nondestructive Crack-Detection Method Using Radioactive Indicators. (In German.) K. Kaindl and A. Mathiaschitz. *Werkstoffe und Korrosion,* v. 2, Oct. 1951, p. 368-369.

The method and typical results on different steels. Micrographs and macrographs. (S19, S13)

33-S. Use of X-Rays in the Foundry. (In Czech.) R. Kleda and J. Zabrs. *Hutnické Listy,* v. 6, Sept. 1951, p. 429-432.

Use for inspection of T-shaped castings. (S13)

34-S. (Book) **The Instrumentation of Open-Hearth Furnaces.** 151 pages. 1951. George Allen & Unwin, Ltd., 40 Museum St, London W.C. 1, England.

Basic principles, including those of automatic control. Applications to individual furnaces to determine working conditions necessary. Part II gives a brief description in non-technical language of the proprietary instruments most commonly used in British melting shops. (S16, S18, D2, ST)

35-S. Reference Radiographs for Inspection of Aluminum and Magnesium Castings. J. J. Pierce. *Machinery* (American), v. 58, Dec. 1951, p. 157-159.

How standard radiographic terminology to be used for defects in Al and Mg castings is to be illustrated in a manual prepared by the Naval Ordnance Laboratory. Test results on specimens containing defects and corresponding radiographs will be incorporated. (S13, Al, Mg)

36-S. Radiography as an Assistant to Foundry Practice. Charles B. Johnson and Stanley A. Brosky. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 151-156; disc., p. 157-158.

A survey. Various aspects of the procedure. (S13, E general)

37-S. Dimensional Checking and Pressure Testing of Gray Iron Castings. Kenneth M. Smith. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 304-308; disc. p. 308.

Previously abstracted from Preprint 14. See item 205-S, 1951. (S14, CI)

38-S. Choosing Equipment for Nondestructive Testing. Carlton H. Hast-

ings. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 309-314.

Previously abstracted from Preprint 15. See item 206-S, 1951. (S13)

39-S. "Spec" Sheets and Their Various Uses. John Taylor. *Transactions of the American Foundrymen's Society,* v. 59, 1951, p. 372-375.

Use of specification sheets in the foundry for profitable operation. A specification sheet gives details of flash size, type of molding machine used or floor used, whether or not facing sand was used, etc. (S22, E general)

40-S. Progress in Photographic Instrumentation in 1950. Kenneth Shaftan. *Journal of the Society of Motion Picture and Television Engineers,* v. 57, Nov. 1951, p. 443-488.

Includes high-speed still and motion photography, cathode-ray still oscillography, interferometry, radiography, photosensitive materials and treatment, optical sources, and various others. 299 ref. (S13, S14, M23)

41-S. Interference Microscope for tne Measurement of Surface Finish. M. Delaunay. *Microtecnic* (English Ed.), v. 5, Sept.-Oct. 1951, p. 248-250.

New type of microscope. (S15)

42-S. Comparative Results of Optical Measurements. (In French.) G. Ribaud, M. M. Michaud, M. M. Riviere, and M. J. Galey. *Chaleur & Industrie,* v. 32, Nov. 1951, p. 301-310.

Experiments on the measurement of temperatures of monocromatic brilliance of flames and of furnace refractories using a photoelectric cell. Effects of fuel type. Includes a comprehensive table of results. (S16)

43-S. "Complete Analysis" of Iron and Steel. (In German.) R. Kraus. *Fresenius' Zeitschrift für analytische Chemie,* v. 133, no. 6, 1951, p. 414-428.

Methods for analyzing pig iron, cast iron, malleable iron, unalloyed steel, and cast steel. 12 ref. (S11, Fe, CI, ST)

44-S. Electronics at Work. John Starr. *American Machinist,* v. 95, Dec. 24, 1951, p. 102-104.

A brief survey of electronic methods in metalworking production jobs, including spot welders, riveters, induction heaters, machine-tool controls, etc. (S18)

45-S. A Steel Plate Thickness Meter. S. S. Carlisle and B. O. Smith. *Engineer,* v. 192, Dec. 21, 1951, p. 805-808.

A portable instrument for measurement by a magnetic method of the thickness of steel plates requiring access to one side of the plate only. The resistance, ultrasonic, and other magnetic methods of measuring the thickness of metal plates from one side only, and the advantages of the magnetic method adopted. Graphs and diagrams. (S14, ST)

46-S. Temperature Measurement and Control. Part II. (Concluded.) J. L. Garrison. *Industrial Heating,* v. 18, Dec. 1951, p. 2188, 2190.

Selection of correct automatic control system. (S16)

47-S. Steel Specifications. Norman E. Woldman. *Iron Age,* v. 169, Jan. 3, 1952, p. 260, 262, 266, 268, 270, 272, 276, 278, 280, 282-283, 286, 288, 290, 294, 296, 298-300, 302, 304-306, 308, 312, 314, 318, 320, 322, 324, 326, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 518, 520.

A brief analysis of various civilian, federal and military specifications designed to aid defense contractors. Lists the composition and form of the material referred to, and notes whether or not it is similar to a better known standard specification. (S22)

48-S. Estimation of Impurities in Aluminium Alloys by Means of Arc Spectra. J. Janiec. *Journal of Applied Chemistry,* v. 1, Nov. 1951, p. 482-488.

Spectroscopic method for the accurate estimation of Pb, Sn, Zn, and Ni in Al. Results are tabulated. (S11, Al)

49-S. Flame Radiation Research Joint Committee: Reports of 1949 Trials at Ijmuiden. I. Introduction. J. J. Broeze, G. Ribaud, and O. A. Saunders. **Purpose and Plan of the Experiments.** J. E. de Graaf and M. W. Thring. **Review of Previous Work on Luminous Radiation.** F. M. Comerford. **Heat-Flow Meters.** R. T. Fowler, D. A. Richardson, and M. Riviere. **Total-radiation Pyrometers.** E. J. Burton, R. Mayorcas, M. Michaud, W. H. Pritchard, and M. Riviere. **Suction Pyrometry.** I. M. D. Halliday. **The Main Experiments.** R. Mayorcas. **Appendix. Control and Instrumentation of the Experimental Furnace.** G. W. Stein Callenfels. *Journal of the Institute of Fuel,* v. 24, Nov. 1951, p. S1-S16.

First part of a report on research into the phenomena of thermal radiation from flames, now being carried out at Ijmuiden, Holland, under the auspices of the Flame Radiation Research Joint Committee, by a team of British, Dutch, French, and Swedish engineers and scientists. 63 ref. (S16)

50-S. High Quality Nonferrous Castings Assured by Use of Radiography. Charles B. Johnson and Stanley A. Brosky. *Materials & Methods,* v. 34, Dec. 1951, p. 73-75.

Use of radiographic inspection to decrease the percentage of rejects

in castings. Reduces machining time and cuts material costs. (S13)

51-S. Ceramic Coating Increases Life of Engine Exhausts. Wilson G. Hubbell. *Metal Progress,* v. 60, Dec. 1951, p. 87-91, 166.

Service tests and thermal shock tests were made on the following materials: 19-9DL stainless steel with ceramic coatings on both interior and exterior; 19-9DL stainless steel with ceramic coatings on interior only; 19-9DL stainless steel, uncoated; 17-14 Cu-Mo steel, uncoated; modified Type 310, uncoated; Type 310 stainless steel with Cb, uncoated; Inconel X, uncoated; N-155, uncoated; and Hastelloy C, uncoated. Micrographs.
(S21, L27, SS, Ni, SG-h)

52-S. Internal Hydrostatic Pressure Testing as a Measure of Performance Values of Oil-Well Casing and Tubing. H. G. Texter. *Oil and Gas Journal,* v. 50, Jan. 7, 1952, p. 78-85.

Acceptable methods of determining whether any given lengths of casing or tubing are capable of withstanding the forces to which they will be subjected in oil well service. Arguments to show that high-internal-pressure testing is the most reliable and least expensive single method of checking performance values. Macrographs.
(S21, ST)

53-S. Notes on High Vacuum, High Temperature Technique in Induction Heating. G. W. Ziegler, Jr., L. E. Bollinger, R. Speiser, and H. L. Johnston. *Review of Scientific Instruments,* v. 22, Nov. 1951, p. 842-843.

Discussed from standpoint of thermocouple measurements and electron bombardment. (S16, M23)

54-S. New Methods and Devices for the Drawing Die Shop. W. Lueg. *Wire and Wire Products,* v. 26, Dec. 1951, p. 1146-1148.

Methods and equipment that have been found helpful in inspection of finished wire-drawing dies. Illustrations show tungsten carbide dies in different conditions. Illustrations and diagrams show working scheme of the "Alfameter" and "Zetmeter" recently developed at the Max-Planck-Institut, Düsseldorf, Germany. (S13, S14, C-n)

55-S. Fluoroscopic Inspection of Light Alloy Castings. Thomas E. Piper and Justin G. Schneeman. *Machinery* (London), v. 79, Dec. 13, 1951, p. 1025-1029.

Differences between fluoroscopic and radiographic methods of inspection, as applied in shop practice. Results obtained with fluoroscopy and its many applications.
(S13, Al, Mg)

56-S. Instrumentation in Iron and Steel Practice With Reference to Automatic Control. W. B. Wright and J. W. Muir. *West of Scotland Iron and Steel Institute Journal,* v. 57, 1949-50, p. 125-159; disc., p. 160-166.

Principles, application, and accuracy to be expected of a number of industrial instruments used in the production of iron and steel. Flow measurement, temperature measurement, CO_2 measurement, and application of automatic control. The various types of automatic-control action. (S16, S18)

57-S. Ultrasonic Detection of Internal Defects. (In French.) R. Pohlman. *Métaux: Corrosion-Industries,* v. 26, Oct. 1951, p. 410-414.

An ultrasonic process in which metallic pieces are placed in a vat filled with CCl_4, $CHCl_3$, or other liquid, making it possible to detect more accurately internal ruptures of thick plates. In one operation, an area up to 500 mm. diam. can be examined. The ultrasonic rays, produced by a quartz crystal or by an ultrasonic transmitter, completely traverse the examined piece and pass through a lens which focuses the rays. The lens is capable of producing, on an image-conversion plane, an exact sonic image of perturbations and defects. Diagrams and illustrations. (S13)

58-S. Spectrographic Analysis of Cast Irons. (In Italian.) Mario Scalise. *Metallurgia Italiana,* v. 43, Nov. 1951, p. 471-475.

Development of quantitative spectrographic procedure utilizing a medium-dispersion prism spectrograph. (S11, CI)

59-S. Spectrochemical Analysis of Lithium. Louis E. Owen and Janus Y. Ellenburg. *Analytical Chemistry,* v. 23, Dec. 1951, p. 1823-1825.

Corrosion studies involving molten Li metal and ferrous alloys made necessary the development of an analytical procedure for determination of metallic impurities. This technique has permitted quantitative study of corrosion rates not only of Li but also of other alkali metals and alkali metal hydroxides.
(S11, R general, Li)

60-S. Radioactive Current Source. *Electronics,* v. 25, Jan. 1952, p. 212, 214.

Radioactivity can be used as a source of electric energy (at low levels) through the use of an "atomic battery" recently developed by the Ohmart Company of Cincinnati, Ohio. The conversion of radioactive energy to electrical energy is obtained by a cell made of two dissimilar materials separated by a filling gas. Uses in corrosion measurement, analysis of alloys, gas

analysis and measurement of vacuum, pressure, and temperature. (S11, S16, S18, R11)

61-S. Photometric Determination of Copper in Iron and Steel with Diethyldithiocarbamate. John L. Hague, Eric D. Brown, and Harry A. Bright. *Journal of Research of the National Bureau of Standards,* v. 47, Nov. 1951, p. 380-384.

Procedure. Typical data are tabulated and charted. 13 ref. (S11, Fe, ST)

62-S. The Use of Optical Comparators in Tool and Cutter Grinding. C. W. Parnham. *Modern Machine Shop,* v. 24, Jan. 1952, p. 112-114, 116, 118, 120, 122.

An inspection machine capable of rapid and accurate checking of parts such as screws, gear teeth, tapers and other unusual shapes which are difficult to check by mechanical means. (S14)

63-S. Theoretical and Practical Sensitivity Limits in Fluoroscopy. D. T. O'Connor and D. Polansky. *Non-Destructive Testing,* v. 10, Fall 1951, p. 10-21.

Expressions are developed which describe the sensitivity or quality of fluoroscopic images in terms of measurable characteristics of X-Ray tubes and fluoroscopic screens. Experimental data are presented in support of these expressions. The requirements imposed by adequate fluoroscopic viewing are used to specify the design features of a proposed fluoroscopic X-Ray tube. A 4-fold improvement in fluoroscopic sensitivity in the inspection of Al and Mg alloys is demonstrated. 49 ref. (S13, Al, Mg)

64-S. Applications of the Triboelectric and the Thermoelectric Effects to the Sorting of Metals. Antony Doscheck. *Non-Destructive Testing,* v. 10, Fall 1951, p. 22-28.

Fundamental principles presented in elementary terms. Apparatus and procedure. An alloy of 90% Ni and 10% Cr has been found to be electrically "positive" to all of a very large number of various pure metals and alloys. Tribo-electric reactions with various types. (S10, P15)

65-S. Weldment Inspection in Aircraft Construction. John W. Sweet. *Non-Destructive Testing,* v. 10, Fall 1951, p. 34-38.

Methods used by Boeing Airplane Co., Seattle, for both steels and light alloys. (S general, ST, Al, Mg)

66-S. Railroad Maintenance Inspection. A. S. Pedrick. *Non-Destructive Testing,* v. 10, Fall 1951, p. 38-43.

An illustrated survey with special reference to practice in the Southern Pacific's shops. (S general)

67-S. Determination of Uranium in Ores. Review of Chemical Methods. F. T. Rabbitts. **Cellulose Column Method. Fluorophotometric Method.** J. B. Zimmerman. *Canadian Mining and Metallurgical Bulletin,* v. 45, Jan. 1952, p. 27-39; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 55, 1952, p. 26-38.

Four chemical methods are outlined. The other two methods are described in more extensive detail. Diagrams, tables, graphs, and illustrations. (S11, U)

68-S. Emergency Specifications For Case-Hardening Steels. *Metallurgia,* v. 44, Dec. 1951, p. 311.

Details of eight new British specifications are summarized in a table. It is estimated that a 50% saving in Ni usage will be effected. (S22, Ni)

69-S. Immersion Pyrometry as an Aid to Smelting Practice; Results of Recent Research in the United Kingdom. *South African Mining and Engineering Journal,* v. 62, pt. 2, Dec. 8, 1951, p. 611, 613.

As applied to steelmaking. (S16, D general, ST)

70-S. Application of X-Ray Inspection in the Foundry. Part II. (In German.) *Metalen,* v. 6, Oct. 15, 1951, p. 359-365.

Reviews X-ray methods of determining the quality of castings. Diagrams and photographs. 20 ref. (S13, E general)

71-S. Quality Control and the Problem of Steel Selection From Commercial and High-Quality Steels. (In German.) Hubert Hoff. *Stahl und Eisen,* v. 71, Nov. 22, 1951, p. 1293-1304; disc., p. 1304-1310.

Quality control in an integrated steelworks, with examples of deep drawing and free-machining steels. Effects of type of melting or deoxidation applied, of pouring conditions, and of composition and degree of purity on workability and service performance. Charts and macrographs. 40 ref. (S12, ST)

72-S. Distortion and Failure of Steam Turbines and Their Prevention. (In German.) Ernst Pohl. *Stahl und Eisen,* v. 71, Dec. 6, 1951, p. 1375-1379.

Warpage of shafts and its elimination; cracks extending from the age hardened zone and the rim caused by prevention of expansion; and fatigue failure of moving blades caused by vibration, notches, and stress-corrosion. Methods of alleviation. Illustrations show various failed pieces. (S21, Q7, ST)

73-S. A Temperature Regulator for Electric Furnaces. (In German.) A. Simon and R. Schrader. *Zeitschrift für anorganische und allgemeine Chemie,* v. 266, Nov. 1951, p. 208-215.

The regulator is not affected by variations of barometric pressure and room temperature. It holds the temperature constant within ± 1° C. (S16)

74-S. Defective Castings and Their Causes. Part II. Non-Destructive Testing of Castings. (In Swedish.) L. Barrling. *Gjuteriet,* v. 41, Nov. 1951, p. 161-171.

A survey. Includes diagrams, photographs, X-ray pictures, and tables. 12 ref. (S13)

75-S. (Book) **Materialprüfung nach dem magnetpulver-Verfahren.** (Materials Testing by the Magnetic Powder Process.) E. A. W. Müller. 144 pages. 1951. Akademische Verlagsgesellschaft, Geest und Portig K.-G., Leipzig, Germany.

Principles, uses, and equipment of the various magnetic-powder methods of materials testing. Numerous illustrations, tabular data, graphs, a comprehensive bibliography, and a list of 52 German and foreign patents. (S13)

76-S. (Pamphlet). **Rapid Identification of Some Metals and Alloys.** 50 pages. Development and Research Div., International Nickel, 67 Wall St., New York 5, N. Y. Free.

Outlines and tables giving spot testing procedures for metals and alloys which can be used in the laboratory and the shop. The procedures are qualitative only. Directions for preparation of reagents. (S11)

77-S. (Book) **Tables for Microscopic Identification of Ore Minerals.** W. Uytenbogaardt. 242 pages. 1951. Princeton University Press, Princeton, N. J. $5.00.

Microscopic procedures. The minerals are arranged in the order of their increasing resistance to polishing and of their increasing reflectivity. Other properties considered are chemical composition, crystal system, Talmage hardness values, color, etching, and certain miscellaneous characteristics, such as twinning and cleaving. Reagents for etch tests. 441 ref. (S10)

78-S. Electronics in the Steel Industry—Past, Present, and Future. H. W. Poole. *Iron and Steel Engineer,* v. 29, Jan. 1952, p. 62-69.

Present applications and practices in this country and abroad, and some future trends. In the steel industry, electronics have been employed in four major fields: power electronics used primarily for power conversion; electronic control; high-frequency electronic heating; and electronic measurements. Examples, of each, particularly power electronics. (S18, ST)

79-S. Stainless Steel Product Standards. George N. Malcolm. *Iron and Steel Engineer,* v. 29, Jan. 1952, p. 70-72.

A step-by-step review of mill processing to attain a specific finish. Covers hot and cold rolling of sheet, plate, or strip; annealing; pickling; and mechanical polishing. (S22, F23, J23, L10, L12, SS)

80-S. Rapid Analysis Determines Cerium in Steel. Charles Morris Johnson. *Iron Age,* v. 169, Jan. 17, 1952, p. 94-96.

A rapid method of determining the cerium group rare-earth elements in steel, where they are used as additive agents, involves precipitation with dry sodium peroxide powder from the acid sulfate solution. La and Nd are precipitated with the Ce. (S11, ST, Ce)

81-S. How to Identify Chrome Steels Quickly. H. M. Randall. *Petroleum Processing,* v. 7, Jan. 1952, p. 60-61.

A simple and rapid field test for identifying corrosion resistant alloy steels according to Cr content recently developed by Engineering Inspection Department of Standard Oil Co. (S10, SS)

82-S. Cobalt 60 in the Foundry. John C. Pennock. *American Foundryman,* v. 21, Jan. 1952, p. 60-61.

Use for detection of internal defects in castings. (S13)

83-S. Determination of Sulfate in Chromium Baths Using Radiobarium. Stanley L. Eisler. *Metal Finishing,* v. 50, Jan. 1952, p. 71-74.

Procedure employing radiobarium in the precipitating agent used for determining sulfate concentration. The concentration was found to be inversely proportional to the counting rate of the filtrate containing the excess radiobarium. Test results compared with those of the conventional gravimetric procedure indicated better results could be obtained by using the radiometric method. (S11, L17)

84-S. Locomotive Parts Inspection With Magnetism, Fluorescence and Black Light. Roy O. Schiebel, Jr. *Diesel Power and Diesel Transportation,* v. 30, Jan. 1952, p. 52-54. (S13)

85-S. Emission Spectroscopy. William F. Meggers. *Analytical Chemistry,* v. 24, Jan. 1952, p. 23-27.

Review of 1950 and 1951 literature. 139 ref. (S11)

86-S. Electroanalysis. Samuel E. Q. Ashley. *Analytical Chemistry,* v. 24,

Jan. 1952, p. 91-95.
Reviews 1949-1951 literature. 162 ref. (S11)

87-S. Ultraviolet Spectrophotometric Determination of Columbium. George Telep and D. F. Boltz. *Analytical Chemistry,* v. 24, Jan. 1952, p. 163-165. (S11, Cb)

88-S. Spectrophotometric Determination of Rhodium With Hypochlorite. Gilbert H. Ayres and Frederick Young. *Analytical Chemistry,* v. 24, Jan. 1952, p. 165-168.
Pd, Pt, Au, Fe, Cr, and Ni ions can be tolerated in relatively large amounts, and Ru, Os, Ir, Co, Mn, and Cu in moderate quantities relative to Rh. Salts of Ir and Co catalyze the decomposition of the hypochlorite. Of the common anions, only iodide and iodate interfere. 11 ref. (S11, Rh)

89-S. Determination of Nitrogen and Sulfur in Steel. H. F. Beeghly, John J. Furey, W. R. Sayre, John L. Hague, Charles S. Mills, A. C. Parsons, and E. T. Saxer. *Analytical Chemistry,* v. 24, Jan. 1952, p. 199-205.
Report of round-table discussion held at 119th Meeting, ACS, Cleveland, Ohio, Apr. 1951. (S11, ST)

90-S. Fluorescent Tracer Agents. J. A. Radley. *International Chemical Engineering & Process Industries,* v. 33, Jan. 1952, p. 30-31.
Various uses of this technique. Application to detect tiny cracks and pinholes in certain sheet materials and to determine whether a batch of material has been properly mixed. (S13)

91-S. Application of the Trioxalatocobaltate (III) Color System to the Spectrophotometric Determination of Macro Quantities of Cobalt. J. P. Mehlig and G. J. Zeagas. *Chemist Analyst,* v. 40, Dec. 1951, p. 76-80.
Experimental procedure and results. The method is easily and rapidly carried out, and results compare favorably with those obtained by the iodide titrimetric method. 17 ref. (S11, Co)

92-S. Application of Statistical Methods. G. F. Komlosy. *Journal of the Birmingham Metallurgical Society,* v. 31, Dec. 1951, p. 178-192.
Some practical examples of these methods in a steel works such as distribution of weights of steel blocks and an investigation into certain drop-forging qualities. (S12, F22, ST)

93-S. International Flame-Radiation Trials in Holland. *Engineering,* v. 172, Dec. 7, 1951, p. 705-706.
Summarizes work being done by an international group. See item 49-S, 1952. (S16)

94-S. Some Uses of Radio-Isotopes in Industry. J. L. Putman. *Metal Industry,* v. 79, Dec. 21, 1951, p. 115-157; Dec. 28, 1951, p. 543-545.
Radioisotopes and their properties. Several metallurgical applications are radiography of thick metal samples, measuring thickness of plating, measuring quantity of an element present, detecting level of molten metal, and measuring the mass of metal in a furnace. Concluding article: Detection of contamination, tracing stages in a complicated chemical process, autoradiographic techniques, and radioactivation analysis. 17 ref. (S19)

95-S. Radiographic Techniques for Examining Steel Castings. *Foundry Trade Journal,* v. 91, Dec. 27, 1951, p. 731-733.
Investigation carried out by members of the nondestructive testing subcommittee of BISRA into the relative merits of a number of radiographic techniques suitable for use on steel castings. Data are tabulated. (S13, CI)

96-S. Physical and Metallurgical Viewpoints in Ultrasonic Testing of Materials. (In German.) H. J. Seeman. *Metall,* v. 5, Dec. 1951, p. 531-537.
The problem of scattering and absorption in solid bodies and its connection with the structure of the test pieces. Data are tabulated and charted. 25 ref. (S13, M27)

97-S. Experiences With Nondestructive Testing of Materials. (In German.) K. Matthaes. *Metall,* v. 5, Dec. 1951, p. 544-546.
Various types of nondestructive tests and their technical advantages. (S general)

98-S. Study of a Method for Measuring the Thickness of Non-Magnetic Layers on Steel. (In Japanese.) Osamu Ito. *Journal of Mechanical Laboratory,* v. 5, Aug. 1951, p. 153-156.
The method consists of measuring the force required to separate a magnet energized by a.c. from the surface of a coated steel article, by use of a self-compensating magnetic balance. Thickness of nonmagnetic coatings and platings on a steel base can be easily measured without destruction. Graphs and tables. (S14, ST)

99-S. A Critical Investigation of the Use of the Silver Reductor in the Micro-Volumetric Determination of Iron, Especially in Silicate Rocks. Christina C. Miller and Robert A. Chalmers. *Analyst,* v. 77, Jan. 1952, p. 2-7; disc. p. 7.
13 references. (S11)

100-S. Controlled Potential Electrolysis in the Analysis of Copper-Base Alloys. G. W. C. Milner, and R. N.

Whittem. *Analyst,* v. 77, Jan. 1952, p. 11-19.

A simple electronic instrument for automatically controlling the potential of the cathode with respect to a standard reference electrode in electro-gravimetric determination of metals. With this instrument, the majority of the usual alloying constituents of Cu-base alloys were successfully determined. 19 ref. (S11)

101-S. The Application of Quality Control in Steel Operations: Ford Motor Company. H. W. Clark. *Blast Furnace and Steel Plant,* v. 40, Jan. 1952, p. 64-70.

Refers to steelmaking and auxiliary operations. Graphs and illustrations. (To be continued). (S12, D general, ST)

102-S. Automatic Furnace Controls. Leo Walter. *Canadian Metals,* v. 15, Jan. 1952, p. 20.

Fundamentals of high-temperature controls. Different systems for automatic control. (S16)

103-S. Low-Cost Atomic Furnace; Important Research Tool. *Iron Age,* v. 169, Jan. 24, 1952, p. 75-77.

Uranium is used as "fuel" in furnace designed by North American Aviation. Predicts that industry and research organizations will be able to afford low-cost, low-power atomic furnaces similar to this one. Production of "tagged atoms" will spur research. Design prevents reactor from destroying itself. Neutron production can be controlled by operator. (S19)

104-S. Magne-Gage Tests Plated Surfaces Quickly. *Iron Age,* v. 169, Feb. 7, 1952, p. 149.

The Magne-gage measures the thickness of both single and composite electrodeposited coatings, providing an indication of their value in preventing corrosion. The device uses the attraction between a small permanent magnet and a plated sample. (S14, L17)

105-S. Apparatus for Vacuum X-Ray Fluorescence Analysis of Light Elements. L. S. Birks. *Review of Scientific Instruments,* v. 22, Dec. 1951, p. 891-894.

Operation, results, and application of the apparatus, applicable to elements from Mg to Ti. (S11)

106-S. Temperature Regulations in Induction Heating. Homer E. Henschen, James W. Edwards, and Herrick L. Johnston. *Review of Scientific Instruments,* v. 22, Dec. 1951, p. 987-988.

Improved apparatus for temperature regulator in induction heating eliminates the optical lever by use of vacuum-tube amplifiers, thus improving sensitivity and eliminating the large time-constant of the galvanometer used in the earlier circuit. (S16, J2)

107-S. Spot Testing Aluminum Alloys. F. J. Bowen. *Steel,* v. 130, Jan. 28, 1952, p. 67, 74.

Simplified separation of different alloys in the field by use of a compact test kit. Flow chart. (S10, Al)

108-S. Measurement of the Thickness of Metal Plate by Ultrasonic Harmonic Method. I. On the Condition of the Thickness Resonance. (In English.) Sakae Tanaka. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 2, Dec. 1950, p. 917-924.

A theoretical demonstration relating to the resonance of the mechanical vibrating system, which is composed of a quartz plate coupled to a metal plate through an oil film. (S14)

109-S. Geiger-Müller Counting Tubes and Their Technical Application. (In French.) R. Berthold and A. Trost. *Métaux: Corrosion—Industries,* v. 26, Nov. 1951, p. 442-455.

Structure and operation of the tubes and their many uses in the metallurgical field. Includes diagrams, charts, and photographs. 18 ref. (S19)

110-S. Use of Radon and Radioactive Isotopes in the Non-Destructive Testing of Materials. (In French.) F. Gottfeld. *Métaux: Corrosion—Industries,* v. 26, Nov. 1951, p. 456-459.

Describes procedures. (S19)

111-S. Autoradiochromatography. (In German.) H. Weil and Trevor I. Williams. *Angewandte Chemie,* v. 63, Oct. 7, 1951, p. 457-460.

Paper chromatograms which contain radio-active isotopes are rendered visible by their action on photographic films. Technique of experimentation and some successful applications. Numerous references. (S19, S11)

112-S. Plant Analysis of Low Iron Contents in Zinc and Aluminum. (In German.) E. Eberius. *Angewandte Chemie,* v. 63, Nov. 7, 1951, p. 513-519.

Photometric method was perfected to be applicable to routine analyses. Includes diagrams, graphs, and tables. 18 ref. (S11, Zn, Al)

113-S. Photometric Analysis of Slight Arsenic Contents in Lead and Its Alloys. (In German.) Heinz Pohl. *Fresenius Zeitschrift für analytische Chemie,* v. 134, no. 3, 1951, p. 177-182.

The method makes it possible to determine 0.0001-0.2% As with an accuracy of ± 0.005%. Data are tabulated and charted. (S11, Pb)

114-S. Standards for the Australian Metals Industry. W. I. Stewart. *Australasian Engineer,* Dec. 7, 1951, p. 81-86.

Background of Australian standards and illustrates some of the problems which arise in the course of this work. The term "standard" is used to indicate a specification or code of practice prepared by a national standards organization. (S22)

115-S. Progress on Many Fronts in ASTM Research and Standardization Work. R. E. Hess and R. J. Painter. *ASTM Bulletin,* Jan. 1952, p. 5-14.

Developments of past year in miscellaneous standards and specifications for metallic and nonmetallic materials. (S22)

116-S. Material Specifications and Standardization. Adrian A. Hofman. *Australasian Engineer,* Dec. 7, 1951, p. 105, 109, 111-113, 115, 117, 119, 121, 123, 125.

The nature of a specification, its uses, and limitations. Suggestions to those responsible for the drawing up of specifications, and the preparation and use of standard specifications. Desirability of rationalizing specifications. (S22)

117-S. Instruments to Fit The Job. Warren Walker, Jr., *Industry and Power,* v. 62, Feb. 1952, p. 71-74.

The most common temperature-measurement instruments, their applications, advantages, and principal differences. (S16)

118-S. Metallurgical Microspectroscopy Using Microdrills. Ford R. Bryan. *Journal of the Optical Society of America,* v. 41, Dec. 1951, p. 1061.

An improved microspectrographic method of identifying metallic constituents in metallurgical specimens. The principle consists of drilling out the minute portion to be analyzed, flowing a material such as collodion over the resulting chips, and transferring the collodion together with chips to a pure carbon electrode for spectrographic analysis. (S11)

119-S. Temperature Control Equipment. *Metal Industry,* v. 80, Jan. 25, 1952, p. 73.

Surveys some recent developments. (S16)

120-S. Ultrasonic Equipment Testing in the Petroleum Industry. Dwight J. Evans. *Oil and Gas Journal,* v. 50, Feb. 4, 1952, p. 70-72, 82, 84.

Ultrasonic instruments used both for detection of hidden flaws and measurement of metal thickness, as exemplified by the "Reflectoscope" and the "Audigage". (S13)

121-S. Field Inspection of Boiler Tubes With Ultrasonic Reflectoscope. J. A. Tash. *Transactions of the American Society of Mechanical Engineers,* v. 74, Feb. 1952, p. 201-205; disc., p. 206.

The ultrasonic reflectoscope and its use in detecting defective small-diameter tubing. (S13)

122-S. The Measuring Accuracy of Filament Pyrometers. (In German.) J. Euler and W. Schneider. *Zeitschrift für angewandte Physik,* v. 3, Dec. 1951, p. 459-467.

Experimental and theoretical studies show that a well-built filament pyrometer can measure temperatures with a high degree of accuracy. Diagrams, graphs, and tables. 12 ref. (S16)

123-S. The Thermocouple as a Radiation Meter; Critical Discussion and Survey of the Present Status of Development. (In German.) L. Geiling. *Zeitschrift für angewandte Physik,* v. 3, Dec. 1951, p. 467-477.

Study of various types of thermocouples. Seebeck effect, Lorenz number, determination of temperature and resistance noises as sources of interference, computation of inertia of thermocouples, and comparative results. Diagrams and tables. 28 ref. (S16)

124-S. (Book) **The Measurement and Control of Temperatures in Industry.** R. Royds. 252 pages. 1951. Constable & Co. Ltd., 10 Orange St., London W.C. 2, England. 25s.

Four chapters are devoted to the techniques applicable to each range of temperature. The construction, calibration, and use of expansion thermometers. Various commercial temperature controllers, using pressure or expansion elements or electrically sensitive temperature elements for on-off and proportional control systems. (S16)

125-S. (Book) **Modern Pyrometry.** Charles H. Campbell. 155 pages. Chemical Publishing Co., 212 5th Ave., New York 10, N. Y. $4.00.

The principles of pyrometry and new developments, as well as a selected group of pyrometric systems which give a good over-all picture of the techniques used and equipment available for temperature measurement and control. (S16)

126-S. (Book) **The Non-Destructive Testing of Metals.** R. F. Hanstock. 163 pages, Institute of Metals, 4 Grosvenor Gardens, London, S.W.1, England. $3.50.

Approaches the subject without limiting reference to any one type of testing such as radiography, magnetic, or ultrasonic methods. Other less known methods are also described with the object of presenting alternative approaches to difficult problems. (S general)

127-S. (Book) **Methodos de Analisis quimicos unificados.** (Standard Methods of Chemical Analysis. (In Spanish.) 2 vols. 163 and 49 pages. July 1950 and July 1951. Instituto del Hierro y del Acero, 15 Villanueva, Madrid, Spain.

Standards established by the Commission for Unification of Methods of Analysis, based on reports from government and private laboratories. Part 1 covers determination of C, S, P, Mn, Si, Cr, Ni, Mo, W, V, Cu, Co, Al, and Sn in steels, ingots, and castings. Part 2 covers determination of Ti, Zr, Cb, and B, and their relationship to various elements in ferrous metals and alloys in general use in the iron and steel industry. (S11, Fe, ST)

128-S. (Pamphlet) **Tabla de Tipificacion de Perfiles especiales para Construcciones soldadas. I Suplemento a la Tabla de Tipificacion de Perfiles Laminados, Abril 1950.** (Table of Characteristics of Special Shapes for Welded Construction. Supplement I to the Table of Characteristics of Rolled Sections, April 1950) (In Spanish.) 2 pages, 1951. Instituto del Hierro y del Acero, 15 Villa nueva, Madrid, Spain.

Tables and diagrams. (S22, K general)

129-S. (Pamphlet) **Tablas technologicas de los Aceros finos de Construccion tipificados. Tabla Tecnologica del Acero al Cr-Ni-Mo de 120 Kgs. No. 282 I.H.A. Tabla tecnologica del Acero al Cr-Mo soldable, No. 831 I.H.A.** (Tabular Technical Data on Typical High-Grade Structural Steels; Tabular Technical Data on a 120-Kg. Cr-Ni-Mo steel, No. 282 I.H.A.; Tabular Technical Data on a Weldable Cr-Mo Steel No. 831 I.H.A.) 23 pages each. Sept. 1951. Instituto del Hierro y del Acero, 15 Villanueva, Madrid, Spain.

Mechanical, physical, and fabrication properties are tabulated and charted. Microstructures are illustrated. (S22, Q general, CN)

130-S. Bath Pyrometry. W. T. Sergy. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 185-195.

The primary types of bath pyrometers currently popular are the blowing-tube radiation type, and the Pt-Pt+13% Rh thermocouple. Use of these instruments at the Pittsburgh works of Jones and Laughlin Steel Corp. and data accumulated since installation of the bath pyrometers. (S16, D2, ST)

131-S. Recent Development in Openhearth Bath Temperature Control. T. J. Hoby and R. J. McCurdy. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 196-202.

A survey. Records of heats of various steels are given. (S16, D2, ST)

132-S. Openhearth Bath Pyrometry. Kenneth J. Vogel. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 202-205; disc., p. 205-207.

Observations made on a Leeds and Northrup bath immersion pyrometer which was put into operation on openhearth furnaces at Edgar Thomson Works, U. S. Steel Co. (S16, D2, ST)

133-S. Steel-Plant Process Control. J. L. Scarry and D. A. Hayes. *Proceedings, National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers,* v. 34, 1951, p. 238-247.

A realistic approach to the solution of the type of process-control problems that may arise in the steel industry; methods used. Graphs. (S18)

134-S. Observations on the Nature of Cracks in Porcelain Enamel. Henry N. Staats. *American Ceramic Society Bulletin,* Feb. 1952, p. 33-38.

Use of the electrified-particle inspection method in locating cracks in glass and porcelain enamel too narrow to reflect light. Includes theory of the method's operation as applied to various types of cracks, relationship between cracks, and performance. (S13, L27)

135-S. Service Tests of Designs of Manganese Castings in Crossings at McCook, Ill. M. J. Zeeman, chairman. *American Railway Engineering Association Bulletin,* v. 53, Feb. 1952, p. 774-775.

Tests indicate that from the standpoint of extent of cracks, the shot peened casting has performed better than the Morden-Ramapo design. No conclusions are justified as to the benefits from shot peening. (S21, Q9, T23, AY)

136-S. Investigation of Failures in Railroad Rails. R. E. Cramer. *American Railway Engineering Association Bulletin,* v. 53, Feb. 1952, p. 843-849.

Results of tests on 52 rails submitted by 15 railroads. A summary and discussion of failures, along with tabulated data for each rail. Photographs. (S21, CN)

137-S. Rail Failure Statistics, Covering (a) All Failures; (b) Transverse Fissures; (c) Performance of Control Cooled Rail. Ray McBrian, chairman. *American Railway Engineering Association Bulletin,* v. 53, Feb. 1952, p. 849-866.

Includes failures reported by 64 railroads on all of their main-line railway mileage. (S21, CN)

138-S. Joint Bar Wear and Failures. Revision of Design and Specifications for New Bars, Including Insulated Joints and Bars for Maintenance Re-

pairs. E. E. Chapman, chairman. *American Railway Engineering Association Bulletin*, v. 53, Feb. 1952, p. 876-894. Includes Appendices: "Tenth Progress Report of the Rolling-Load Tests of Joint Bars," R. S. Jensen; and "Service Tests on the Burlington Railroad Near Fort Morgan, Colo., of Joint Bars of Different Metallurgies."

Detailed information and results of service tests. Includes rolling-load tests, ways of increasing fatigue life, micrographs revealing decarburization, effects of heat treatment and of chemical composition. (S21, Q9, CN)

139-S. Rail Failures Resulting From Engine-Wheel Burns, Including Effect of Repairing Such Burns by Oxy-Acetylene or Electric Welding. J. B. Akers, chairman. *American Railway Engineering Association Bulletin*, v. 53, Feb. 1952, p. 894-898. (S21, K1, K2, CN)

140-S. Ferrous Metallurgy. H. F. Beeghly. *Analytical Chemistry*, v. 24, Feb. 1952, p. 252-258.

Recent advances in ferrous analytical chemistry. Includes new reagents, new apparatus, improved techniques, methods for making analytical separations, and methods for determining smaller amounts by simple procedures. 172 ref. (S11, Fe)

141-S. Nonferrous Metallurgy. M. L. Moss. *Analytical Chemistry*, v. 24, Feb. 1952, p. 258-265.

Reviews literature since 1949 on methods for analysis of nonferrous metals. 325 ref. (S11, EG-a)

142-S. Determination of Carbon, Oxygen, and Sulfur in Copper; Vacuum Fusion Analysis Using the Mass Spectrometer. W. M. Hickam. *Analytical Chemistry*, v. 24, Feb. 1952, p. 362-366.

10 ref. (S11, Cu)

143-S. 2,9-Dimethyl-1, 10-Phenanthroline; New Reagent Specific in Spectrophotometric Determination of Copper. G. Frederick Smith and W. H. McCurdy, Jr. *Analytical Chemistry*, v. 24, Feb. 1952, p. 371-373. (S11, Cu)

144-S. The Application of Quality Control in Steel Operations, Ford Motor Company; Statistical Quality Control at the Rolling Mill. Part II. H. W. Clark. *Blast Furnace and Steel Plant*, v. 40, Feb. 1952, p. 201-207.

Methods established for realizing standards of quality performance. (S12, F23, ST)

145-S. Industrial Applications of Sonic Energy. C. Richard Soderberg, Jr. *Iron and Steel Engineer*, v. 29, Feb. 1952, p. 87-94; disc., p. 94-95.

Sonic methods are proposed to clean openhearth gases. They also show promise for other steel-plant applications such as agitators for pickling. (S18, D2, L12)

146-S. The Control of Quality on Mass-Produced Engineering Parts. *Machinery* (London), v. 80, Feb. 14, 1952, p. 296-300.

Recommendations concerning the application of multigaging machines for checking parts on a 100% basis. Details for several machines. (S14)

147-S. Calibration Furnaces. Frances Mortimer. *Research*, v. 5, Feb. 1952, p. 82-85.

Two new furnaces designed for the calibration of total radiation pyrometers. Although intended primarily for steelworks and laboratory use, the details of the construction of these furnaces should interest many industrial laboratories. (S16)

148-S. Firing Temperatures Controlled. Michael Bozsin. *Steel*, v. 130, Feb. 25, 1952, p. 82-83.

System in which electronic recording instruments, riding through furnaces in a specially designed box, give porcelain enamelers closer control of furnace temperatures during production. (S16, L27)

149-S. Inspection Time Pared. *Steel*, v. 130, Mar. 3, 1952, p. 78.

Briefly describes the use of Co^{60} in nondestructive inspection for soundness of large castings. (S13, Co)

150-S. Radiography of Pipe Welds With Isotopes. J. G. M. Turnbull. *Welding and Metal Fabrication*, v. 20, Feb. 1952, p. 70-73.

Includes radiographs of test plates. Refers specifically to power-station steam pipes. (S13, K9, ST)

151-S. 31-MeV Radiographic Inspection of Metal Parts. *Brown Boveri Review*, v. 28, Sept.-Oct. 1951, p. 301-310.

Directions for the radiographic inspection of metal workpieces. Shows, by means of practical examples, that the fault sensitivity and sharpness of definition of the radiographs obtained with 31-MeV X-rays are excellent. Radiographic technique is shown to be much simpler with 31-MeV radiation than with conventional X-ray inspection. Radiographs of iron parts are shown. (S13)

152-S. Radioisotopes Aid Metallurgy, Part 1. Gordon H. Guest. *Canadian Metals*, v. 15, Feb. 1952, p. 16-17.

The role of radio-isotopes in the study of metals, their characteristics and application in diffusion processes, corrosion studies, steelmaking, flotation, and radiography. (To be continued.) (S19)

153-S. X-Ray Testing of Welds for High-Pressure Vessels. T. B. Johnston.

Gas Times, v. 70, Feb. 22, 1952, p. 241-242, 247.

Procedure used at Durie Foundry in Leven, Scotland. (S13, K9, ST)

154-S. New Tool Steels and Carbides. *Iron Age,* v. 169, Mar. 6, 1952, p. 228, 232-235, 238-240, 242, 244, 246, 248, 250, 252, 254, 256, 258-277.

A list of the newest tool materials —specifications of more than 400 toolsteels, die steels, and carbides introduced since 1949. (S22, TS, C-n)

155-S. Radiography in Engineering. L. Mullins. *Machinery Lloyd* (Overseas Ed.), v. 24, Feb. 16, 1952, p. 69-81.

Some of the ways in which radiography may help engineers. General theory and advantages of gamma and X-radiography; also the limitations. Actual working methods. (S13)

156-S. Immersion Pyrometry in the Steel Industry. Frances Mortimer. *Metallurgia,* v. 45, Feb. 1952, p. 88-90.

A general account of present practice and future trends. (S16)

157-S. How to Interpret the Quality of Antifriction Bearings. Hilding Törnebohm. *Microtechnic* (English Ed.), v. 5, Nov.-Dec. 1951, p. 387-393; disc., p. 394. (Translated from the French.)

Includes an outline of the checking procedure. (S13, S14, S15)

158-S. Analytical Methods for the Determination of Cyanides in Plating Wastes and in Effluents From Treatment Processes. Earl J. Serfass, Robert B. Freeman, Barnett F. Dodge, and Walter Zabban. *Plating,* v. 39, Mar. 1952, p. 267-273.

The two methods recommended were selected from an experimental investigation of about eight different methods given in the literature. They are intended to determine total cyanide, i.e., not only the cyanide present as the anion, CN^-, but also that present in various complexes with metals. (S11, L17)

159-S. Soviet and Czechoslovakian Structural Steels. (In Czech.) Ladislav Jenicek. *Hutnické Listy,* v. 6, Nov. 1951, p. 531-537.

The importance of basic raw materials in the production and classification of alloy steels. Czech specifications are compared graphically with Russian ones. (S22, AY)

160-S. Analytical Methods of Determining Gases and Nonmetallic Inclusions in Steel. (In Czech.) Miroslav Sicha. *Hutnické Listy,* v. 6, Dec. 1951, p. 590-593.

Analytical methods for determining amounts of H_2, M_2 and O_2 in steels. Micro-analytical methods were used for nonmetallic inclusions. Vacuum extraction at 1650° C. was used for gaseous analyses. Data are tabulated. 24 ref. (S11, M27, ST)

161-S. Physics of Metals; Morphological Analysis of Fractures. (In French.) H. de Leiris. *Metaux: Corrosion—Industries,* v. 26, Dec. 1951, p. 471-496.

A comprehensive study of the macrostructure of various types of cracks and failures of different metals. Morphological analysis of failures by progressive crack development; and morphological analysis of semibrittle tears. Of failures of large tanks and of ships. Numerous macrographs. 24 ref. (S21, Q26, ST)

162-S. New Procedures for Electronic Nondestructive Testing of Materials. (In French.) D. F. Förster. *Metaux: Corrosion—Industries,* v. 26, Dec. 1951, p. 497-513.

Study of the theoretical bases of electronic nondestructive testing of materials with the aid of Foucault currents. Apparatus is diagrammed and illustrated. Includes charts, sketches, and photographs. (S13)

163-S. Recent French Contributions to Gas Analysis of Iron and Steel Products. (In French.) E. Jaudon. *Métallurgie et la Construction Mécanique,* v. 83, Nov. 1951, p. 840, 843, 845, 871.

Recent methods for determining O_2, H_2, and N_2. Photographs, tables, and diagrams. 25 ref. (S11, Fe, ST)

164-S. New Analytical Method in Lead Metallurgy and Future Perspectives. (In French.) Niccolo Rossi Canevari. *Revue de Métallurgie,* Dec. 1951, p. 912-916; disc., p. 916.

A polarographic method for analyzing Pb specimens obtained from the molten mass before casting; use of Pb as protection against nuclear radiation. Polarograms and tables. (S11, T29, Pb)

165-S. Study of the Spectral Analysis of Highly Alloyed Steels. (In French.) J. Eeckhout, J. Cruse, and J. Gillis. *Revue Universelle des Mines, de la Metallurgie des Travaux des Sciences et des Arts Appliqués a l'Industrie Publics,* ser. 9, v. 94, Dec. 1951, p. 440-447.

Possibilities of the method, and conditions likely to furnish the best results. Optimum conditions of excitation were studied and supported by results of analyses checked by chemical methods for the different elements entering into the composition of steel. Tables and charts. 12 ref. (S11, AY)

166-S. A New Apparatus for Direct Spectrochemical Analysis. (In French.) A. Hans. *Revue Universelle des Mines, de la Metallurgie des Travaux Publics des Sciences et des Arts Appliqués a*

l'Industrie, ser. 9, v. 94, Dec. 1951, p. 448-451.

Apparatus of Belgian construction. Results obtained on various steel samples. Excellent stability of the new instrument. Circuit diagrams and tables. (S11)

167-S. Present State of Temperature Control in the Operation of Blast Furnace Hot Blast Stoves. (In German.) Erich Martin. *Stahl und Eisen,* v. 72, Feb. 14, 1952, p. 176-185.

Methods used and their limitations. (S16, D1, Fe)

168-S. Methods of Determining Oxygen in Metals. (In German.) J. Fischer and H. Bechtel. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 5, Jan. 1952, p. 14-19.

Surveys literature. Experimental results on the analysis of O_2 especially in Cu, Pb, Al, and Zn. Diagrams, graphs, and tables. 19 ref. (S11, Cu, Pb, Al, Zn)

169-S. Statistical Correlation of Highly Scattered Data. (In Italian.) F. Gatto. *Alluminio,* v. 20, Dec. 1951, p. 533-539.

After explaining the practical limitations of ordinary methods, some improvements are suggested. The methods were applied to determination of the hardness-breaking stress ratio for Al alloys containing Zn, Mg, and Cu. Data are charted. 12 ref. (S12, Q29, Q26, Al)

170-S. Swedish Standards for Bronze and Red Brass Ingots. (In Swedish.) *Gjuteriet,* v. 41, Dec. 1951, p. 186-187. (S22, Cu)

171-S. Measuring Average Thickness of Plated Coatings. *Metal Finishing,* v. 50, Mar. 1952, p. 81.

Calculation method. Table gives factors applicable to 13 different metals most commonly electrodeposited. (S14, L17)

172-S. Fluorescent Penetrant Inspection of Jet Propulsion Engine Component Parts. W. B. Buckman. *Non-Destructive Testing,* v. 10, Winter 1951-52, p. 11-13.

The basic steps and principles in fluorescent penetrant inspection and its application to above parts. (S13)

173-S. Non-Destructive Testing as Applied to Tank Parts Inspection. J. K. McDowell. *Non-Destructive Testing,* v. 10, Winter 1951-52, p. 14-15.

Radiographic and magnetic-particle inspection for military tanks made at Rock Island Arsenal. (S13, ST)

174-S. Testing of Railroad Rails by the Ultrasonic Resonance Method. Peter K. Bloch. *Non-Destructive Testing,* v. 10, Winter 1951-52, p. 16-18.

The ultrasonic resonance method lends itself to the design of relatively simple, portable, battery-operated equipment. In addition to testing rail ends at joint, this equipment is practical for testing rail in other critical locations such as frogs, switches, grade crossings, water pans, tunnels, etc. (S13, CN)

175-S. Magnetic Particle Inspection of Jet Engine Parts. A. Robinson. *Non-Destructive Testing,* v. 10, Winter 1951-52, p. 19-23.

Value as an aid in design of units and in selection of materials, determining the quality of incoming materials, and investigating new processing methods. (S13)

176-S. Magnetic Particle Inspection. C. M. Geist. *Non-Destructive Testing,* v. 10, Winter 1951-52, p. 27-28.

Utility for metal parts inspection by the manufacturer. Special reference is made to parts welded, highly heat treated, or machined. (S13)

177-S. Radiographic Metallography. (In French.) C. Chaussin. *Métallurgie et la Construction mecanique,* v. 83, Jan. 1952, p. 35-37, 39; Feb. 1952, p. 99-101.

Production, characteristics, and techniques. Applications of X- and γ-rays in the testing of weldments. Sensitivity and value of the methods, and the nature and the production of the rays. (S13, M21)

178-S. Physical Aspects of the Testing of Metals by Means of Ultrasonics. (In French.) H. J. Seemann. *Métaux: Corrosion—Industries,* v. 27, Jan. 1952, p. 14-23.

The problem of the absorption and dispersion of ultrasonic waves in solid bodies of polycrystalline structure, on the basis of the literature. Data are tabulated and charted. 17 ref. (S13)

179-S. The Belgian Method of Ultrasonic Testing of Materials. (In French.) G. A. Homes, Y. Ots, and E. Symon. *Métaux: Corrosion—Industries,* v. 27, Jan. 1952, p. 24-33.

The method and apparatus used. Applications, particularly for the detection of laminations. Typical examples. The value of the method. Schematic diagrams and photographs. (S13)

180-S. Magnetic and Electrical Processes for Nondestructive Testing of Metallic Pieces. (In French.) Werner Jellinghaus. *Metaux: Corrosion—Industries,* v. 27, Jan. 1952, p. 34-43.

Reviews and evaluates these processes on the basis of the literature.

Apparatus is illustrated by circuit and schematic diagrams. 15 ref. (S13)

181-S. Nondestructive Materials Testing by Means of Ultrasonics Using the Transit-Time Echo Process. (In German.) Adolf Lutsch. *Archiv für das Eisenhüttenwesen,* v. 23, Jan.-Feb. 1952, p. 57-65.

The process and how it can be used to determine grain structure and detect defects in metals. Tables, graphs, diagrams, photographs, and micrographs. 21 ref. (S13, M23)

182-S. Processes for the Determination of the Gas Content of Light Metals. I. Bases of the Determination Process. II. Plant Processes. III. Laboratory Processes. (In German.) H. Kostron. *Metall,* v. 6, Mar. 1952, p. 115-123.

A review on the basis of the literature. The process of extraction at high temperatures seems to provide the most exact results; however, it is said to be too complicated for general use. Actually deals only with Al and its alloys. Need for further research and its probable direction. 38 ref. (S11, Al)

183-S. Electromagnetic Thickness Gages Using a Magnetic Circuit. (In German.) J. H. Zaat. *Metalloberfläche,* ser. A, v. 5, Dec. 1951, p. A185-A191.

Investigations using a magnetic circuit on nonferromagnetic layers. Results are tabulated and charted; possibilities of errors are indicated. (S14)

184-S. Measurement of Luster as a Method of Evaluating Metallic Surfaces. (In German.) Joh. Elze and H. Grüss. *Metalloberfläche,* ser. A, v. 6, Feb. 1952, p. A17-A23.

Instrument measures strictly directed reflection, reflection within a selected range of dispersion angle and astigmatism of dispersion. Diagrams, photographs, graphs, photomicrographs, and tables. (S15)

185-S. Effect of a Diffusion Layer on the Electrochemical Determination of Oxygen and Oxide Coatings on Metals. (In German.) F. Todt, S. Kahan, and W. Schwarz. *Zeitschrift für Elektrochemie Berichte der Bunsengesellschaft für Physikalische Chemie,* v. 56, Jan. 1952, p. 19-23.

Shows that current density is proportional to oxygen concentration within wide range in accordance with Fick's first law of diffusion. The gradual drop in current density as result of formation of a diffusion layer is shown to agree with theory. Data are graphed and tabulated. 12 ref. (S11, N1)

186-S. Measuring the Temperature of a Flux During Its Melting. (In Russian.) M. M. Timofeev. *Avtogennoe Delo,* v. 22, July 1951. p. 26-27.

A tungsten-graphite thermocouple and arrangement for measuring the temperature of welding-rod coatings. A calibration curve is given. (S16, K1)

187-S. Spectrochemical Slag and Ore Analysis. (In Swedish.) C. Georg Carlsson. *Jernkontorets Annaler,* v. 135, no. 12, 1951, p. 607-620.

A spectrochemical method previously described in English was tried for the determination of rock constituents of iron-ore concentrates. It was found necessary to incorporate a fluxing operation in order to convert all samples to the same mineralogical state. Typical results are tabulated and charted. (S11, Fe)

188-S. Spectrographic Determination of Palladium, Platinum, Iridium, and Rhodium; Porous Cup Technique. Gilbert H. Ayres and Eugene W. Berg. *Analytical Chemistry,* v. 24, Mar. 1952, p. 465-469.

A method for determination of Pd and for simultaneous determination of Pt, Ir, and Rh in solution. The working range for Pd is 5-160 ppm. Tables and graphs. (S11, EG-c)

189-S. Spectrophotometric Determination of Zirconium. E. W. Kiefer and D. F. Boltz. *Analytical Chemistry,* v. 24, Mar. 1952, p. 542-544.

A micro-method for 1-80 ppm. Table and graphs. (S11, Zr)

190-S. Radioisotopes Aid Metallurgy. Part 2. Gordon H. Guest. *Canadian Metals,* v. 15, Mar. 1952, p. 18-19.

Concludes review of present and potential applications in corrosion, steelmaking, and other problems. 16 ref.
(S19, R general, D general, ST)

191-S. Using Iridium 192 for Castings Inspection. *Canadian Metals,* v. 15, Mar. 1952, p. 41.

Procedure of Ford Motor Co. of Canada, Ltd. (S19, S13)

192-S. Crack-Detector for Wire Threads. John H. Jupe. *Electronics,* v. 25, Apr. 1952, p. 226.

New crack detector of French origin has many applications in connection with manufacture of radio tubes, picture tubes, and electric light bulbs because it can be used for thin wires. Diameters from 0.8 to 32 mm. can be handled irrespective of whether they are insulated or nonmagnetic. (S13, Mo, W)

193-S. A Gauge for Testing Metal Coating Thickness Suitable for Use With Paints, Ceramic Coatings, Plas-

tic or Paper. *Finish,* v. 9, Apr. 1952, p. 17.

Thickness of coatings can now be measured within 0.0005 in. accuracy by a new instrument built by the Ryan Development Laboratory and designed by the National Bureau of Standards. (S14)

194-S. Temperatures of Moving Strip Checked Continuously at Alan Wood. Warren Walker, Jr. *Industrial Heating,* v. 19, Mar. 1952, p. 455-456, 458, 460.

Equipment and procedures of Alan Wood Steel Co., Conshohocken, Pa. (S16, F23, ST)

195-S. A New Method for Surface Flaw Detection. *Industry & Welding,* v. 25, Apr. 1952, p. 79-80.

The Faxfilm process in which an exact reverse replica of a test surface is quickly made in clear plastic. Projection of this replica in a microprojector provides a magnified representation of the surface, with marked three-dimensional effect. (S13)

196-S. Recording Device Checks Quality of Automatic Welds. George A. Hatfield. *Industry & Welding,* v. 25, Apr. 1952, p. 86-88.

Device is connected across the electrode and work to record voltage pattern of a weld. To correlate the pattern on the chart with the welded part, both the part and its chart pattern are numbered, and if the chart curve deviates from normal, the part is x-rayed. (S18, K1)

197-S. Fundamental Reactions in the Vacuum-Fusion Method and Its Application to the Determination of O_2, N_2, and H_2 in Mo, Th, Ti, U, V, and Zr. H. A. Sloman, C. A. Harvey, and O. Kubaschewski. *Journal of the Institute of Metals,* v. 80, Mar. 1952, p. 391-407.

Application of the method to six metals. A mechanism for the reactions forming the basis of the method, derived from practical results and thermodynamical calculations. Results showing the relation between gas contents and methods of preparation or subsequent treatments of the various metals, together with some observations on effects of the gaseous elements on their properties. Detailed derivations of thermodynamic data used are given in an Appendix. Data are tabulated. 10 ref. (S11, P12)

198-S. The Opaque-Stop Microscope as a Means of Studying Surface Relief. W. M. Lomer and P. L. Pratt. *Journal of the Institute of Metals,* v. 80, Mar. 1952, p. 409-411.

Some results obtained by the above method as applied to metallic and nonmetallic surfaces. (S15)

199-S. A Magnetic Thickness Gauge of New Design. E. G. Harrison. *Journal of Scientific Instruments,* v. 29, Mar. 1952, p. 89-91.

The instrument employs a movable permanent magnet to produce the balancing force; the same magnet also serves to energize the soft iron armature. Accuracy compares favorably with that of other instruments. Modifications whereby the range may be extended in both directions. (S14)

200-S. New Steel Compositions to Conserve Critical Alloying Elements. *Materials & Methods,* v. 35, Mar. 1952, p. 121.

Tables supplement data published in the Oct. 1951 issue; see item 147-V, 1951. Covers standard steels; new steels developed to conserve nickel; alternate boron steels; and tentative-standard boron steels. (S22, CN, AY)

201-S. Nuclear Reaction Radiography and Auto-Radiography of Metals. Mats Hillert. *Metal Treatment and Drop Forging,* v. 19, Mar. 1952, p. 135-137.

New radiographic method called nuclear reaction radiography, with particular reference to the examination of an Fe-B alloy. A number of controlling factors for good results. Photomicrographs. (S13, M23, Fe, AY)

202-S. A High-Resolution Surface-Profile Microscope. S. Tolansky. *Nature,* v. 169, Mar. 15, 1952, p. 445-446.

Describes improvements made by reversing the illumination, using a bright field crossed by a dark line, instead of a light slit on a dark field. (S15)

203-S. Automatic Process Controls in the Steel Industry. E. Whitehead. *Research,* v. 5, Mar. 1952, p. 133-139.

Types of control being applied in the steel industry, with specific reference to automatic control of gas booster fans, gas producers, and openhearth furnaces. Considerable savings in manpower and maintenance have already been achieved. Extensive research is being carried out to develop control systems suitable for some of the many other processes used in steel production. (S18, D general, ST, Fe)

204-S. Holland Standardizes. Part I. F. van Teutem. *Standardization,* v. 23, Mar. 1952, p. 68-74, 92.

An illustrated review of important industrial organizations in Holland and their experiences with standardization. (To be continued.) (S22)

205-S. X-Ray Fluorescence Analysis —Nondestructive Testing at Shop

Level. Fred Behr. *Steel,* v. 130, Mar. 24, 1952, p. 70-71.

Method which identifies each element in 3 to 5 min. after specimens are prepared. (S11)

206-S. Ultrasonic Flaw Detection. (In Polish.) J. Tabin. *Prace Glownego Instytutu Metalurgii,* v. 3, No. 6, 1951, p. 517-526.

Various methods used in ultrasonic production testing, and principles of operation and of technique. Graphs, diagrams, and micrographs. (S13)

207-S. Shadow Method of Measuring the Smoothness of Surfaces. (In Russian.) V. V. Bernavskii. *Stanki i Instrument,* v. 22, Aug. 1951, p. 17-19.

Use of a microscope and light source. (S15)

208-S. Cast Aluminium Alloys. *Automobile Engineer,* v. 42, Mar. 1952, p. 100.

Provides a table for reference to the standard designations and trade names of related specifications. (S22, A1)

209-S. Advantages of X-Ray Inspection. J. Rigby. *Canadian Metals,* v. 15, Apr. 1, 1952, p. 36-37.

Limitations of X-rays, flaw location, scatter effects, penetration, fluoroscopy, and limitation of radiography. Gamma radiography is included, noting that radioisotopes are adding versatility by offsetting cost, portability, and range limitations. (S13)

210-S. A New Apparatus for Direct Spectro-Chemical Analysis. A. Hans. *Engineers' Digest,* v. 13, Mar. 1952, p. 82. (Translated and condensed.)

Previously abstracted from *Revue Universelle des Mines de la Métallurgie des Travaux Publics des Sciences et des Arts appliques a l'Industrie.* See item 166-S, 1952. (S11)

211-S. Non-Stop From Slab to Strip. Warren Walker, Jr. *Instrumentation,* v. 5, 1st qtr., 1952, p. 13-14.

Temperature measurement and control in 30-in. strip mill of Alan Wood Steel Co., Conshohocken, Pa. (S16, F23, ST)

212-S. Analytical Methods for the Determination of Cyanates in Plating Wastes and in Effluents From Treatment Processes. Barnett F. Dodge and Walter Zabban. *Plating,* v. 39, Apr. 1952, p. 381-384.

Several methods were studied and it was finally concluded that the use of Nessler's reagent was both the simplest and the shortest. Details are tabulated and charted. Recommended routine procedure. (S11, L17)

213-S. Symposium on Industrial Radiology. An Analysis of Radiographic Image Quality. D. Bromley. **The Present State of Non-Destructive Testing of Materials in Germany.** R. Berthold. *Welding and Metal Fabrication,* v. 20, Mar. 1952, p. 110-112.

Radiographic inspection of welds and the quality of radiographs. (To be continued.) (S13)

214-S. (Book) **Electronic Applications.** Henry A. Miller. 110 pages. 1951. E. & F. N. Spon, Ltd., 22 Henrietta St., London, W.C.2, England.

Includes diagrams and photographs of a wide range of present applications. Electron tubes, electronic motor control, regulating and counting, detecting and testing, electronic temperature control, photoelectric control, radio, radio control, radar, and television, electronics in medicine, and miscellaneous applications of electron tubes. (S general)

215-S. (Book) **Industrial Uses of Radioactive Fission Products.** 102 pages, Sept. 1951, Stanford Research Institute, Stanford, Calif.

On the basis of a field survey and correspondence, Stanford Research Institute has evaluated preliminary suggestions for specific uses of fission products showing industrial promise. Introduction; conclusions; technical and engineering considerations; marketing considerations; cold sterilization of drugs, medical supplies and foods; activation of chemical reactions; phosphor activation; static elimination and miscellaneous uses; penetration and detectability of radiation; economic considerations; and fission product research program. Includes 4-page bibliography. (S19)

216-S. (Book) **Magnetic and Electrical Methods of Non-Destructive Testing.** D. M. Lewis. 242 pages. 1951. George Allen & Unwin, Ltd., Ruskin House, Museum St., London W.C.1, England.

Intended as a work of reference for the technicians in ferrous and nonferrous metal making and working industries. Numerous graphs, diagrams, and illustrations. (S13)

217-S. (Book) **A New Approach to Engineering Tolerances.** J. Gilson. 99 pages. 1951. Machinery Publishing Co., Ltd., Clifton House, Euston Rd., London N.W.1, England.

A critical presentation of the considerations necessary for the allocation and maintenance of realistic tolerances in modern economic production. Production factors and economic tolerances for various fabrication and assembly processes, means of expressing tolerances on

drawings, effects of tolerances on fits, and standard limit and fit systems. (S22, G general)

218-S. (Book) The Science of Precision Measurement. 256 pages. DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill. $3.50.

Interprets the nationally and internationally accepted lineal standard of measurement by giving instruction and showing its practical application to production and inspection of manufactured parts. Accuracy necessary to control thousandths-inch production tolerances. Practical procedures in utilizing instruments such as gage blocks and gaging instruments. A new method using optical flats and a "visible scale" to determine surface flatness, finish, parallelism is introduced. Recommended procedures for statistical sampling of parts for dimensional quality control. Mobile inspection systems. (S14)

219-S. Recording Voltmeter Checks Weld Quality. George A. Hatfield. *American Machinist,* v. 96, Apr. 14, 1952, p. 158.

Technique used in inspection of steel pipes by National Supply Co., Torrance, Calif. (S13, K9, ST)

220-S. Determination of Small Amounts of Cadmium in Lead by a One-Colour Dithizone Method. Louis Silverman and K. Trego. *Analyst,* v. 77, Mar. 1952, p. 143-148.

Procedure for the colorimetric determination of small amounts, 0.01-0.4%, of Cd in Pb or Pb alloys without prior removal of Pb. Detailed alternative procedures and extensions of the method for samples containing more or less Cd. (S11, Cd, Pb)

221-S. The Absorptiometric Determination of Thorium in Magnesium-Base Alloys by 1-(o-arsonophenylazo)-2-naphthol-3: 6-disulphonic Acid. A. Mayer and G. Bradshaw. *Analyst,* v. 77, Mar. 1952, p. 154-158.

A red color is developed when the reagent is added to a Th solution. If Zr is present Th is separated by precipitation as oxalate. None of the other elements normally present in Mg alloys interferes. The method gives results correct to within 2%, can be applied to samples with widely differing Th content and is reasonably rapid. Preparation of the reagent. (S11, Mg, Th)

222-S. Determination of Tin in Copper-Base Alloys. Jorma Kinnunen and Bengt Merikanto. *Chemist Analyst,* v. 41, Mar. 1952.

(S11, Sn, Cu)

223-S. Draft British Standard for Sprayed Metal Coatings. *Electroplating and Metal Finishing,* v. 5, Apr. 1952, p. 133, 135-136, 138.

A summary and commentary on work by a committee of the British Standards Institution. (S22, L23)

224-S. The Development of Engineering Metrology. F. H. Rolt. *Engineer,* v. 193, Mar. 21, 1952, p. 448-450; Apr. 4, 1952, p. 480-483.

An extensive survey of procedures and equipment. (S14)

225-S. Liquid Steel; Measurements and Recording of Temperature at Abbey Works. *Iron and Steel,* v. 25, Apr. 1952, p. 144.

(S16, D general, ST)

226-S. The Pilot "Plus 3" Gauging System. F. W. M. Lee. *Machinery* (London), v. 80, Mar. 27, 1952, p. 531-537.

A new system devised to provide tolerances suitable for modern engineering practice. Tables and graphs. (S14)

227-S. The Analysis of Chromium Plating Baths Containing Fluorides and Fluosilicates. H. A. van Oosterhout and E. J. C. van de Velde. *Metal Finishing,* v. 50, Apr. 1952, p. 60-63, 69.

Two analytical methods are compared. The distillation method is preferred. Tables and apparatus diagram. 18 ref. (S11, L17, Cr)

228-S. Testing by Non-Destructive Methods. Rolt Hammond. *Overseas Engineer,* v. 25, Mar. 1952, p. 274-276; Apr. 1952, p. 322-324.

Recently developed practices. Importance of the electric resistance strain gage. Developments in radiographic applications in shipbuilding and other spheres, place of radioisotopes, and need for systematic procedure in radiographic testing. (S general, Q25)

229-S. New System of Quality Control Introduced by T. I. Aluminium Ltd. *Sheet Metal Industries,* v. 29, Apr. 1952, p. 345.

Method now in operation at the T. I. Aluminium Ltd. foundry at the South Wales Aluminium Co., Ltd. Resolven, near Neath. The speed with which results are obtained permits the checking of the metal in the furnace before it is cast, and any corrections necessary can be made immediately. The exact analysis of every slab or billet cast is known prior to casting, and the continuity of product quality and smoother production flow assured in the rolling and extrusion mills. (S11, Al)

230-S. The Spectrophotometric Determination of Molybdenum in Molybdenum Steels. (In English.) P. Karsten and J. H. C. Van Mourik. *Recueil*

des Travaux Chimiques des Pays-Bas, v. 71, Feb., 1952, p. 302-308.

The existing Mo determination with thiocyanate is put on a firmer basis. The recommended procedure is adapted to it and applied to Mo steels. (S11, AY)

231-S. A New Time-of-Gassing Test of Thickness of Cadmium Coatings, Particularly for Small Parts. S. G. Clarke and J. F. Andrew. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 267-272.

A Ni salt in concentrated HCL has a strong equalizing effect on the rate of solution of Cd coatings which otherwise dissolve at different speeds. Details of its use in a simple improved time-of-gassing method. (S14, Cd)

232-S. The A.R.D. Magnetic Thickness Tester for Coatings on Steel. E. S. Spencer-Timms. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 273-277.

An instrument for the nondestructive determination of the thickness of electrodeposited coatings on steel. (S14, ST)

233-S. Ammonium Nitrate Method for Determination of Thickness of Cadmium Coatings by Loss-in-Weight. S. G. Clarke and E. E. Longhurst. "Protection and Electro-Deposition of Metals", His Majesty's Stationery Office (London), 1951, p. 278-281.

The method is described and an appendix gives results of tests. (S14, Cd)

234-S. Study of Magnetic Fields at a Crack in a Magnetized Steel Plate. R. D. Kodis and G. A. Darcy. *ASTM Bulletin*, Apr. 1952, p. 71-73.

A synthetic crack of varying depth in a steel plate was produced, and the magnetic field leakage around this crack studied by means of a magnetic tape-recording head. The magnetic leakage field was measured with respect to depth of crack, level of magnetizing force applied to the steel plate, and distance of the search head above the cracked plate. (S13, ST)

235-S. Estimation of Composition of Ancient Metal Objects. Utility of Specific Gravity Measurements. Earle R. Caley. *Analytical Chemistry*, v. 24, Apr. 1952, p. 676-681.

The validity and utility of specific gravity measurements as a means of estimating the composition of all kinds of ancient metal objects. 18 ref. (S11)

236-S. Industrial Use of Sound. Boyd A. Wise, Jr. *Battelle Technical Review*, v. 1, Apr. 1952, p. 40-41.

Present and potential applications, with emphasis on high-frequency sound waves or ultrasonics. Methods of generation of these waves and their use in nondestructive testing. (S13)

237-S. Use of Powder Metallurgy Techniques Means Faster Preparation of Spectrochemical Standards. Walter O. Gerber, Jr. *General Electric Review*, v. 55, May 1952, p. 58-60.

Recommended for its flexibility and for new compositions hard to analyze, including Al-containing alloy steel and stainless iron. (S11, H general, AY, CI, Al)

238-S. Platinum-Platinum/Rhodium Thermocouples and Their Industrial Applications. Marcel Chaussain. *Proceedings of the Institute of British Foundrymen*, v. 44, 1951, p. A60-A77; disc., p. A77-A80.

Previously abstracted from *Institute of British Foundrymen.* See item 352-S, 1951. (S16)

239-S. System of Studying Casting Defects. G. W. Nicholls and D. T. Kershaw. *Proceedings of the Institute of British Foundrymen*, v. 44, 1951, p. A147-A163; disc., p. A163-A169.

Previously abstracted from *Institute of British Foundrymen;* item 353-S, 1951. (S12, E general)

240-S. Evaluation of Soundness in Cast Iron; Report and Recommendations of Sub-Committee T.S. 20 of the Technical Council. A. Tipper, chairman. *Proceedings of the Institute of British Foundrymen*, v. 44, 1951, p. A292-A315; disc., p. A315-A317.

Previously abstracted from *Institute of British Foundrymen;* item 400-S, 1951. (S13, CI)

241-S. Review of Present-Day Steelfoundry Radiographic Practice. G. M. Michie. *Proceedings of the Institute of British Foundrymen*, v. 44, 1951, p. A318-A329; disc., p. A329-A331.

Previously abstracted from *Institute of British Foundrymen;* item 28-S, 1952. (S13, S19, CI)

242-S. Development and Contemporary State of Spectrographic Analysis in the USSR. (In Czech.) Adolf Pokorny. *Hutnické Listy*, v. 7, Feb. 1952, p. 62-64.

A brief outline. (S11)

243-S. Spectrographic Determination of Magnesium in Modified Cast Iron. (In Czech.) I. Ruzicka and Z. Zika. *Hutnické Listy*, v. 7, Feb. 1952, p. 64-67.

A precision within 1-4% of the total Mg content was obtained. Results are compared with those of chemical analyses. (S11, CI)

244-S. Nondestructive Testing of Materials. IV. Indirect Methods. (In French and German.) Hch. Zoller. *Pro-Metal,* v. 5, Feb. 1952, p. 957-963.

Apparatus is based on the imgrams and illustrations. (S13)

245-S. A New Ultrasonic Probing Apparatus. Its Practical Utilization. (In French.) J. Krautkrämer and H. Krautkrämer. *Métaux: Corrosion—Industries,* v. 27, Feb. 1952, p. 89-94.

Apparatus is based on the impulse and reflection method. In the case of defects near the surface, minimum depth of defect necessary for a direct indication is lowered considerably. Even at 8 mm. depth, the echo is separated from the impulse. Measuring with precision the width of surfaces is possible on sheets 3 mm. wide. (S13)

246-S. The Importance of Spectral Analysis in Foundry Practice. (In German.) O. Werner. *Giesserei,* v. 39, Feb. 21, 1952, p. 73-81.

Advantages and limitations of spectral analysis, development of suitable equipment, methods of work in the foundry, and evaluation of the results. The problem of accuracy on the basis of the literature. Economic aspects. Data are tabulated and charted. 32 ref. (S11, E general)

247-S. Statistical Interpretation by Means of Punched Cards of Original Data for Materials Supplied for a Large Steelworks. (In German.) Heinrich Rübmann. *Stahl und Eisen,* v. 72, Mar. 27, 1952, p. 351-353.

Application of IBM-type cards to daily and monthly reports of blooming mills, pit furnaces, and rolling mills. Graphs and illustrations. (S12, F23, ST)

248-S. Oxygen Determination in Lead. (In German.) Klaus Barteld and Wilhelm Hofmann. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 5, Mar. 1952, p. 102-105.

Apparatus for determining O_2 in Pb by the manometric H_2-reduction method. Data are graphed and tabulated. 10 ref. (S11, Pb)

249-S. Mathematical-Statistical Principles of Sampling and Assaying of Ores, Metals, and Residues. (In German.) Ulrich Graf and Hans-Joachim Henning. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 5, Apr. 1952, p. 127-131.

(S11, B11)

250-S. Photoactive Coefficients of Gamma and X-Rays. (In Italian.) W. Ruff. *Alluminio,* v. 21, Jan. 1952, p. 7-14.

Factors affecting the quality of photographic images obtained by use of gamma and X-rays. Instead of the method based on thickness differences, it is suggested that photometric methods be used to determine blackening differences as a function of thickness. Applicable to nondestructive testing. Tables, graphs, and illustrations. 10 ref. (S13)

251-S. Condition for Preparing Standards for Smoothness of Turning, Grinding, or Lapping. (In Russian.) Iu. D. Ligsnii. *Stanki i Instrument,* v. 22, Sept. 1951, p. 20-27.

Preparation of samples for determining the smoothness produced by various machining operations on steel, cast iron, bronze, duralumin, and silumin. Data are tabulated and charted.
(S15, G17, ST, CI, Cu, Al)

252-S. Roundness Measurement. *Aircraft Production,* v. 14, May 1952, p. 151-153.

A high-precision recording production-type instrument is called the Talyrond. Radial magnification range is 200-10,000 and one division of 0.1 in. on the radial coordinate can represent an error range from 0.0005 to 0.000025 in. Photographs and specimen charts. (S14)

253-S. Sorting Scrap. *Aircraft Production,* v. 14, May 1952, p. 153.

Separation of high speed steel from carbon steel scrap by induced rusting. (S10, TS, CN)

254-S. Requirements of Machine-Shop Inspection. C. Walker and F. H. Greenwood. *Foundry Trade Journal,* v. 92, Apr. 24, 1952, p. 433-439.

The machinist's viewpoint of the quality of castings, from the design, jigging, accuracy, machinability, and inspection angles. Tables and photographs.
(S general, G17)

255-S. Metallurgical Applications of X-Ray Fluorescent Analysis. P. K. Koh and Betty Caugherty. *Journal of Applied Physics,* v. 23, Apr. 1952, p. 427-433.

Techniques using a Geiger counter goniometer. Influence of potential variations, specimen preparation, and thickness of diffracting crystal. Various measurements were made on a number of common commercially pure metallic elements; on constituents of Fe-Ni, Fe-Cr, and Fe-Ni-Cr alloys; and on several steels. Tables and graphs. (S11)

256-S. Chemical Analysis of Light Metals and Alloys. II. Sec. 1. The Analysis of Aluminium and Its Alloys. S. T. Payne. *Light Metals,* v. 15, Apr.

1952, p. 127-128.
(To be continued.) (S11, A1)

257-S. A Sensitive Comparator For Measuring Wires. J. C. Evans, R. S. Marriner, and I. G. Morgan. *Machinery* (London), v. 80, Apr. 24, 1952, p. 735-739, 744.

Suitable for laboratory measurement of variation in diameter of wires as small as 0.001 in. in diameter. It is a pneumatic type and can provide a continuous record. Apparatus diagrams. (S14)

258-S. Chemical and Crystallographic Analysis With Electron Beams. *Metal Progress,* v. 61, May 1952, p. 182, 184. (Translated and condensed from "Application of Electron Beams to a Point-to-Point Chemical and Crystallographic Analysis", R. Castaing, *Recherche Aeronautique,* v. 23, 1951, p. 41-50.)

Procedure using an electrostatic-type electron microscope. Emission of characteristic X-rays permits point-to-point chemical analysis. Metallurgical applications include establishment of intermetallic diffusion curves, investigation of local variations in concentration within alloys; and especially, analysis of segregations, precipitates, or inclusions of unknown or less known nature. Possibilities exist for crystallographic analysis using a monocrystalline anode. (S11, M23)

259-S. Interpreting X-Ray Radiographs of Welds. E. M. Greve. *Petroleum Engineer,* v. 24, May 1952, p. D95-D96, D98, D100.

A discussion of weld effects and how they are disclosed by X-ray inspection. (S13, K9)

260-S. X-Rays at Work for Industry. R. A. Young. *Research Engineer* (Georgia Institute of Technology), Mar. 1952, p. 3-4, 13-18.

The three major X-ray techniques (spectroscopy, x-ray diffraction, and radiography), and some of their industrial applications.
(S13, M21, M22)

261-S. Pipe Weld Site Radiography. F. H. Gottfeld. *Welding & Metal Fabrication,* v. 20, May 1952, p. 189-190. (A condensation).

Comparative values of results of X-ray and gamma-ray inspection of 60 miles of pipeline. Some comparative laboratory tests using X-rays, cobalt source, and a betatron. Tables. (S13)

262-S. Application of the Electron Microscope to Measurement of Specific Surfaces. Determination of the Effectiveness of Grinding. (In French.) René Bernard, Emile Pernoux, and Stanislas Teichner. *Journal de Chimie physique et de Physico-Chimie biologique,* v. 49, Mar. 1952, p. 147-156.

Factors influencing above measurements. Tables and graphs. 24 ref. (S15, M21)

263-S. Use of Stigmatic Spectrography in Metallurgical Analysis. (In French.) Pierre-Jean Bouchet. *Revue de Métallurgie,* v. 49, Mar. 1952, p. 177-184.

Use of an intermittent arc obtained with a continuous current of 220 volts; influence of composition of the electrodes. Application to the analysis of massive electrodes and powdered specimens. Schematic diagrams, graphs, and spectrograms. 10 ref. (S11)

264-S. Contribution to the Determination of Nitrogen in Certain Alloy Steels and Ferro-Alloys. (In French.) P. Rocquet and M. Olette. *Revue de Métallurgie,* v. 49, Mar. 1952, p. 221-230.

A method which makes it possible to determine by acid attack the N content in steel or ferro-alloys containing elements which form refractory nitrides. Diagrams, photographs, and tables. (S11, AY, Fe-n)

265-S. Spectrographic Determination of Impurities in Cadmium. (In Italian.) Mario Scalise. *Metallurgia Italiana,* v. 44, Apr. 1952, p. 153-157.

Results of a series of determinations. Equipment. Advantages over chemical analysis. Tables and graphs. (S11, Cd)

266-S. (Book) **ASTM Standards on Copper and Copper Alloys.** 504 pages. Feb. 1952. American Society for Testing Materials, 1916 Race St., Philadelphia, Pa.

New edition covers Cu and Cu alloys, cast and wrought Cu and Cu alloy electrical conductors; and nonferrous metals used in Cu alloys. (S22, Cu)

267-S. (Book) **Practical Radiography For Industry.** H. R. Clauser. 301 pages. 1952. Reinhold Publishing Corp., 330 W. 42nd St., New York 36, N. Y. $7.50.

Concrete working information on modern radiographic technique. Nearly 200 illustrations, including sample radiographs. Separate chapters are devoted to radiography with radium and Co^{60}, fluoroscopy, and miscellaneous applications. (S13)

268-S. Rapid Spectrophotometric Determination of Silicon and Manganese in Cast Iron. John R. Boyd. *Analytical Chemistry,* v. 24, May 1952, p. 805-807.

Determination of above elements

in a single weighed sample in about ⅛ the time necessary by gravimetric and volumetric means. Accuracy compares favorably with former methods. The procedure is of value to cast iron foundries which have a high melting rate and where changes of composition might cause heavy losses if not quickly corrected. 21 ref. (S11, CI)

269-S. Fire Assay for Iridium. R. R. Barefoot and F. E. Beamish. *Analytical Chemistry,* v. 24, May 1952, p. 840-844.

Significant losses of Ir to basic slags were noted, although satisfactory collections of Ir could be made when neutral or acid slags were used. Two methods for analysis of Pb-Ir buttons are outlined. Losses of Ir during cupellation were confirmed. A detailed examination of efficiency of a fire assay for extraction of Ir from ores; sources of error. 21 ref. (S11, Ir, Pb)

270-S. Precision Determination of Carbon in Metals by a High Frequency Combustion-Volumetric Method. Leonard P. Pepkowitz and Paul Chebiniak. *Analytical Chemistry,* v. 24, May 1952, p. 889-891.

Table shows accuracy and precision obtained with standard steels. Also applicable to other metals. (S11)

271-S. Spectrophotometric Study of Cadmium 1,10-Phenanthroline System. Coe Wadeline with M. G. Mellon. *Analytical Chemistry,* v. 24, May 1952, p. 894-896.

Study was made to determine the feasibility of using the system for determination of Cd. (S11, Cd)

272-S. Quantitative Spectrographic Analysis of Slags. W. J. Price. *British Cast Iron Research Association Journal of Research and Development,* v. 4, Apr. 1952, p. 315-335.

Method for the spectrographic analysis of slags which can be generally applied in routine analysis. All the metallic oxide constituents of a single slag may be estimated in about 2 hr. with an accuracy of 3%. Short survey of "rapid" slag-control methods and a review of spectrographic literature related to the problem, followed by a description of the work done in developing the recommended method. 39 ref. (S11, Fe)

273-S. Quality Control of Lead-Bronze Bearings. E. Uhlir. *Engineers' Digest,* v. 13, Apr. 1952, p. 117, 120. (Translated and condensed from *Machinenbau und Wärmewirtschaft,* v. 7, Jan. 1952, p. 4-8.)

Procedure for detecting defects in bearing lining which can be integrated easily in the production process. Instead of the usual hardness tesing and X-ray examination, a visual procedure was developed. Cutting speed during machining is merely reduced and tool angle set at 80°. The resulting surface shows all defects, even nonuniform Pb distribution. Casting problems. (S13, Cu, SG-c)

274-S. Instrumentation. Ralph H. Munch. *Industrial and Engineering Chemistry,* v. 44, May 1952, p. 97A-98A, 100A.

The Magne-Probe for nondestructive testing of high-temperature alloy parts. Principle is that magnetic permeability indicates physical structure. (S13, SG-h)

275-S. Metallurgical Nickel Analysis. W. D. Mogerman. *Industrial and Engineering Chemistry,* v. 44, May 1952, p. 971-973.

Historical review of analytical difficulties that delayed general recognition of Cronstedt's discovery of ni. The methods most widely used in metallurgical laboratories for determining Ni in both small and large quantities. Some practical hints for eliminating certain sources of error in gravimetric work. (S11, Ni)

276-S. Resume of Thermocouple Checking Procedures. Henry C. Quigley. *Instruments,* v. 25, May 1952, p. 616-622; *I. S. A. Journal,* v. 8, May 1952, p. 51-57.

The procedures are of two general classifications; calibration by comparison with calibrated standards and calibration at fixed points. Under the first classification are the methods of comparison in place, in tube and muffle furnaces, and in baths. Under the second are procedures utilizing freezing points, melting points, and boiling points. (S16)

277-S. Emission Spectroscopy in the Steel Industry. E. R. Vance. *Ohio Journal of Science,* v. 52, May 1952, p. 114-117.

Practice at Steel and Tube Division, Timken Roller Bearing Co., Canton, Ohio. (S11, ST)

278-S. Quality Control—You'll Need a System. C. W. Kennedy. *Steel,* v. 130, May 19, 1952, p. 90-92.

An example of quality control found effective by Pantex Mfg. Co., Pawtucket, R. I., in meeting military specifications. Charts. (S12)

279-S. Contribution to the Analytical and Experimental Study of the Variations of Temperatures of Electric Furnaces as a Function of Time and of Fuel Supplied. (In French.)

M. Billy and J. Brefort. *Chaleur & Industrie,* v. 33, Apr. 1952, p. 98-106.

A theoretical study of the thermal characteristics of electrical furnaces. Includes charts. (S16)

280-S. Contribution to Spectrographic Examination of Metal Foil. (In German.) G. Rätze. *Aluminium,* v. 28, May 1952, p. 152.

Fabrication of electrodes by briquetting foil or strip. (S11, T5)

281-S. Standardization and Testing of Drawing Dies. (In German.) A. Pomp. *Schweitzer Archiv fur Angewandte Wissenschaft und Technik,* v. 18, Mar. 1952, p. 97-101.

Status in Germany. New processes and instruments for measuring the shape of the die hole. Diagrams, photographs, and graphs. 11 ref. (S22, F28)

282-S. Present Status of X-Ray and Gamma-Rav Testing of Materials. (In German.) Rudolf Berthold, Otto Vaupel, and Norbert von Wetterneck. *Stahl und Eisen,* v. 72, Apr. 24, 1952, p. 492-499; disc., p. 499-500.

Progress made in exposing films with portable X-ray equipment for 300 kv. with continuous-constant current voltage. Improving the quality of pictures by fine-grained X-ray films and lead amplifier foils. Gamma-ray radiators available. Diagram of exposure with possibility of detecting faults when exposing films with Co^{60} and Ir^{192} and comparison with X-ray pictures. Economic efficiency of film exposures with gamma-ray radiators. Protection against radiation when using gamma-rav radiators. Tables and graphs. (S13)

283-S. Ultrasonic Nondestructive Testing of Materials. (In German.) Josef Krautkrämer. *Werkstoffe und Korrosion,* v. 3, Apr. 1952, p. 125-128.

See abstract of "A New Ultrasonic Probing Apparatus, Its Practical Utilization", J. Krautkrämer and H. Krautkrämer, *Métaux: Corosion-Industries;* item 245-S, 1952. (E13)

284-S. Radioisotopes Add a New Dimension. Ralph Belcher. *Battelle Technical Review,* v. 1, May 1952, p. 52-53.

Miscellaneous applications as tracers, uses of radioactive fission products, radiography, and other production-control procedures. (S19)

285-S. Equipment for Non-Destructive Testing. G. Rigby. *Canadian Metals,* v. 15, May 1952, p. 22-23.

Various methods and their applications. (S13)

286-S. Tentative Specifications for Magnesium-Base Alloy Sand Castings. *Foundry,* v. 80, June 1952, p. 189-190.

Data sheet. ASTM designation is B80-51T. Covers chemical analysis and mechanical properties. (S22, Q general, Mg)

287-S. Methods of Rating Furnace Capacity in the Steel Industry. *Industrial Heating,* v. 19, May 1952, p. 845-846.

Recommendations by American Iron and Steel Institute. (S12, D general)

288-S. Through Hell in a Box. Michael Bozsin. *Instrumentation,* v. 6, 2nd qtr., 1952, p. 13-14.

Equipment which enables an instrument to ride through enameling furnaces during production runs in the determination of firing temperatures. (S16)

289-S. How to Analyze Tin-Bronze Alloys. C. Goldberg. *Iron Age,* v. 169, May 29, 1952, p. 86-87.

Recommended procedures for sampling and determination of Sn, Pb, Cu, Fe, Ni, Zn, P, Si, Al, and Mn. (S11, Cu)

290-S. Hydrogen; Determination in Liquid Steel. R. M. Cook and J. D. Hobson. *Iron & Steel,* v. 25, May 17, 1952, p. 239; disc., p. 261-264.

Previously abstracted under similar title from *Journal of the Iron and Steel Institute,* item 425-S, 1951. (S11, ST)

291-S. The Tucumcari Tank Failure. *Journal, American Water Works Association,* v. 44, May 1952, p. 435-440; disc., p. 441.

Report of New Mexico Society of Professional Engineers on disaster of Dec. 13, 1951. A poorly welded vertical butt joint between ½-in. shell plates is believed to have been responsible for the failure. Failure to follow AWWA specifications was also a contributory factor. (S21, K1, CN)

292-S. Use of Radioactive Isotopes in Industry. *Mining Journal,* v. 238, May 9, 1952, p. 473-474.

Applications in flotation, smelting, refining, wear, and plating studies. 13 ref. (S19, B14, D general, Q9, L17)

293-S. Selection of X-Ray Detectors for Automatic Inspection. J. E. Jacobs and A. L. Pace. *Non-Destructive Testing,* v. 10, Apr. 1952, p. 12-17.

Various methods, their advantages, disadvantages, and applications. 14 ref. (S13)

294-S. Multi-Directional Magnetic Particle Inspection. R. A. Peterson. *Non-Destructive Testing,* v. 10, Apr. 1952, p. 18-22.

Principles and practical application of procedure developed to locate simultaneously defects in any plane. Equipment and typical results. (S13)

295-S. Curved Crystal Developments in Ultrasonic Resonance Testing. C. R. Betz. *Non-Destructive Testing,* v. 10, Apr. 1952, p. 28-31.

Even where flat crystals give usable indications, greatly improved results are obtained by use of a crystal ground to fit the work. In particular, use of a curved crystal and suitable fixtures often makes rapid production inspection possible. (S13)

296-S. How to Reduce Fishing Jobs, Extend Life of Drill Strings. R. S. Martin. *Oil and Gas Journal,* v. 51, June 2, 1952, p. 97-101.

Systematic inspection system for drill pipe which has reduced fishing jobs 90%, while at the same time extending the life of the drill string as much as 100%. (S general, ST)

297-S. Purchasing Specs for Powder Metal Bearings Meet MPA-ASTM Standards. *Precision Metal Molding,* v. 10, June 1952, p. 30-32, 83-84.

Standards established by Engineering Standards Dept., International Business Machines Corp. Comparison with MPA-ASTM standards. Graphs. (S22)

298-S. Temperature Measurement in Flame-Hardening. *Railway Gazette,* v. 96, May 9, 1952, p. 520-521.

An automatic photocell device which compares radiation from a comparison filament and from the work surface. Used with a flame hardening machine, automatic control of the hardening temperature is obtained. (S16, J2)

299-S. The Matrix Micro-Maag as an Internal Gauging Standard. Max Maag. *Microtechnic* (English Ed.), v. 6, No. 1, 1952, p. 26-29. (Translated from the German.)

Internal micrometer—a 3-point-contact instrument for rapid and reliable internal measurements with an accuracy of 1μ. (S14)

300-S. Principles of the Magneto-Inductive Measurement of Non-Ferromagnetic Layers on Iron Bases, Especially With Varying Radiation of Curvature. (In German.) Paul Koch. *Metalloberfläche,* sec. A, v. 6, May 1952, p. A67-A70.

Accuracy of measuring layer thicknesses by this method requires consideration of curvature by adjusting the zero point of the measuring instrument to curvature of the uncoated part. Diagrams, tables, and graphs. (S14)

301-S. A Novel High Vacuum Furnace. E. J. Caule. *Canadian Journal of Technology,* v. 30, Apr. 1952, p. 63-65.

Suitable for high-temperature studies of small specimens of metal and other applications. Apparatus diagram. (S16)

302-S. Supersonic Testing of Rail Ends. C. J. Code. *Railway Engineering and Maintenance,* v. 48, June 1952, p. 570-571.

Expanding use and effectiveness of relatively new method. (S13, CN)

303-S. Ultrasonics. Inspection Applications Grow. Ralph H. Frank. *Steel,* v. 130, June 16, 1952, p. 99-102.

Brief general discussion and some examples, illustrated with diagrams. (S13)

304-S. Fixed Gage Standards and Practice. Part I. William H. Gourlie. *Tool Engineer,* v. 28, June 1952, p. 40-42, 71-72.

Includes tables of tolerances. (To be continued.) (S14)

305-S. (Book) **Bolt, Nut, and Rivet Standards.** 247 pages. Industrial Fasteners Institute, 3648 Euclid Ave., Cleveland 15, Ohio. $3.00.

Revision of the so-called "Red Book" (published in 1941). Accepted standards of nomenclature, dimensions, sizes, and other practices. (S22, K13)

306-S. (Book) **Industrial Process Control By Statistical Methods.** John D. Heide. 297 pages. 1952. McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y.

Practical manual for use of statistics to control the quality of industrial products during the manufacturing process. Statistical methods required and practical and technical problems of applying them to factory processes. Mathematics are kept as simple as possible. (S12)

307-S. (Book) **Deistvuiushchie Tekhnicheskie Usloviia na Produktsiiu Tsvestnoi Metallurgii.** (Technical Operating Conditions in Nonferrous Metallurgical Production.) Ed. 2. 490 pages. 1949. Government Scientific-Technical Publishing House for Literature on Ferrous and Nonferrous Metallurgy, Moscow, U.S.S.R.

Handbook of Soviet standards, specifications, and approved procedures for testing and inspection. Includes tables of compositions of standard alloys used in the U.S.S.R. (S22, EG-a)

308-S. (Book) **Migrogeometriia Obrabotannoi Metallicheskoi Poverkhnosti i Ee Izmereniia.** (Microgeometry of Machined Metallic Surface and Its Measurement.) V. A. Barun. 180 pages. 1948. Government Scientific-Technical Publishing House for Machine-Industry Literature, Moscow and Leningrad, U.S.S.R.

The present status of measurement of surface finish of machined

metallic surfaces and methods and devices for this purpose. Basic concepts; apparatus. The problem of standardization of surface quality. 24 ref. (S15)

309-S. Report of Committee A-1 on Steel. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 85-106.

Previously abstracted from Preprint 2. See item 271-S, 1951. (S22, CN, AY)

310-S. Report of Committee B-1 on Wires for Electrical Conductors. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 133-143.

Previously abstracted from Preprint 7. See item 273-S, 1951. (S22, T1, Cu)

311-S. Report of Committee B-5 on Copper and Copper Alloys, Cast and Wrought. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 147-166.

Previously abstracted from Preprint 10. See item 274-S, 1951. (S22, Cu)

312-S. Report of Committee E-3 on Chemical Analysis of Metals. *American Society for Testing Materials, Proceedings,* v. 51, 1951, p. 478-481.

Recommendations on revisions of standards and practices; activities of divisions and subcommittees. (S11)

313-S. Report of Committee A-1 on Steel. *American Society for Testing Materials,* Preprint 2, 1952, 45 pages.

Recommendations affecting standards and specifications. Mechanical testing of structural steel. Specifications for heavy-walled carbon and low-alloy steel castings for steam turbines; for 5% Cr, 0.5% Mo steel plates for boilers and pressure vessels; for alloy steel bars for nitriding; for electric fusion welded austenitic Cr-Ni alloy steel pipe for high-temperature service; and for carbon and alloy steel forgings for rings for reduction gears. (S22, Q general, ST)

314-S. Report of Committee A-3 on Cast Iron. *American Society for Testing Materials,* Preprint 3, 1952, 5 pages.

Includes proposed tentative specifications for chilled and white-iron castings. (S22, CI)

315-S. Report of Committee B-5 on Copper and Copper Alloys, Cast and Wrought. *American Society for Testing Materials,* Preprint 11, 1952, 18 pages.

General recommendations affecting standards and specifications. Proposed tentative specification for rectangular copper wire for general purposes and for Cu-base-alloy centrifugal castings. (S22, Cu)

316-S. Report of Committee B-7 on Light Metals and Alloys, Cast and Wrought. *American Society for Testing Materials,* Preprint 13, 1952, 30 pages.

Recommendations affecting standards and specifications. Proposed tentative recommended practice for codification of light metals and alloys, cast and wrought; proposed tentative specifications for Al and Al-alloy pipe, tube, rod, bars, shapes, sheet, and plate for pressure-vessel applications; and for Al bars for electrical purposes. (S22, Al)

317-S. Spectrophotometric Determination of Nickel in Steel With Potassium Dithiooxalate. J. P. Mehlig and B. J. Newby. *Chemist Analyst,* v. 41, June 1952, p. 28-31.

Method was developed for the above determination which involves separation by dimethylglyoxime, conversion of the precipitate into the nickelo-dithiooxalate complex, and spectrophotometric measurement of the light transmitted by the latter solution. 10 ref. (S11, Ni, ST)

318-S. Bismuth Thermocouples. Alvin B. Kaufman. *Instruments,* v. 25, June 1952, p. 762, 802-803.

Properties and applications of ductile Bi and Bi-alloy thermocouples, especially in the low-temperature range. Practical directions for preparation of junctions and for use. (S16, P15, Bi, SG-a)

319-S. How a Small Shop Uses Quality Control. Don Spath. *Iron Age,* v. 169, June 19, 1952, p. 143-146.

Quality control methods used at General Products Corp., Jackson, Mich., a small contract machine shop. (S12)

320-S. Beta Gage Measures Strip Thickness. *Iron Age,* v. 169, June 19, 1952, p. 149.

Brief description of instrument which furnishes an automatic record. (S14)

321-S. Inspection of Electroplated Aircraft Parts. P. Skeggs. *Journal of the Electrodepositors' Technical Society,* v. 28, 1952, p. 15-26. (Preprint.)

The general inspectional requirements of D.T.D. specifications covering plating of aircraft parts. Stamping and methods of testing generally; and the particular requirements of certain specifications. Surface treatment of Zn and Cd coatings. (S13, L general, Zn, Cd)

322-S. Arc Spectra of Gallium, Indium, and Thallium. William F. Meg-

gers and Robert J. Murphy. *Journal of Research of the National Bureau of Standards,* v. 48, Apr. 1952, p. 334-344.

Systematically investigated photographically in the octave 6500 to 13,000 Å. The spectra were excited in d.c. arcs and recorded on infra-red-sensitive photographic emulsions with a concave diffraction grating 22 ft. in radius. 17 ref. (S11, Ga, In, Tl)

323-S. Power Supply for a Thermionic Ion Source. C. Reuterswärd. *Journal of Scientific Instruments,* v. 29, June 1952, p. 184-185.

Characteristics and details of a regulated a.c. generator, by means of which ion currents constant to some tenths of a percent are obtained for mass spectroscopic investigations. Background and operational information. Circuit diagram. (S11)

324-S. Apparatus for Conversion of Infra-Red Spectrometer Records to Percentage Transmission. R. A. G. Carrington and J. G. Reynolds. *Journal of Scientific Instruments,* v. 29, June 1952, p. 197-199.

Photographs and charts. (S11)

325-S. A Torsion Balance for Weighing Evaporated Films. P. L. Clegg and A. W. Crook. *Journal of Scientific Instruments,* v. 29, June 1952, p. 201-203.

Balance which works within a vacuum chamber. Used in thickness measurement of metal films. (S14)

326-S. Specifications Relating to Aluminium and Magnesium. *Light Metals,* v. 15, June 1952, p. 202-203.

A revised list of British specifications. (S22, Al, Mg)

327-S. Ultrasonic Inspection Checks Quality of Brazed Joints. H. Greenberg. *Materials & Methods,* v. 35, June 1952, p. 102-105.

How good correlation between shear testing and ultrasonic inspection resulted in adoption of this nondestructive test method for brazed circuit-breaker contacts. Cupaloy (99.5% Cu + 0.5% Cr) is brazed to 65% W + 35% Ag. Correlation chart, oscillograms, and a table of advantages and disadvantages. (S13, K8, Cu, W)

328-S. Boron and Tentative Standard Steels. *Metal Progress,* v. 67, June 1952, p. 96-B.

Tabulation of AISI compositions issued Mar. 25, 1952. (S22, AY)

329-S. Various Inspection Methods Used in Heat Treating Shops. Stanley A. Gill. *Metal Treating,* v. 3, May-June 1952, p. 9-11.

Nondestructive test methods developed by Magnaflux Corp.: magnetic-particle inspection; and fluorescent penetrant usage. (S13, J general)

330-S. A Resume of the Ship Fracture Problem. Finn Jonassen. *Welding Journal,* v. 31, June 1952, p. 316s-318s.

Work of the Ship Structure Committee has led to major improvements in existing ships and points the way for better steels, fabricating procedures, and design in new construction. (S21, ST)

331-S. (English.) An Apparatus for Quantitative Spectrographic Analysis in Controlled Atmospheres. R. St. J. Emery. *Spectrochimica Acta,* v. 4, no. 6, 1952, p. 513-515.

Apparatus enabling small samples of metal to be analyzed spectrographically in any selected single gas or mixture of gases. The apparatus may also be used for analysis at reduced pressures. (S11)

332-S. (French.) Inspection of Castings by Means of Gamma Rays. Albert Blondel. *Fonderie,* May 1952, p. 2938-2944.

Various radiographic devices, and technique of operation using gamma rays. Tables, graphs, photographs, and radiographs. (S13)

333-S. (French.) Spectrochemical Analysis of Steelmaking Slags. René Castro and René Loude. *Spectrochimica Acta,* v. 4, no. 6, 1952, p. 496-512.

Standard samples were prepared by sintering mixtures of the constituents in definite proportions. These sintered standards give similar spectra to those obtained from fused slags of the same composition; and have therefore made it possible to explore the effect of interfering elements on others and to complete a range of standard samples corresponding to the normally made slags. Two methods of carrying out the analysis; in each the samples are made of pressed pellets of a mixture of the slag with Ni powder. (S11, B21)

334-S. Report of Committee B-2 on Non-Ferrous Metals and Alloys. *American Society for Testing Materials,* Preprint 9, 1952, 11 pages.

Proposed tentative specifications for iodide titanium, titanium strip, sheet, plate, bar, tube, rod, and wire, and titanium ingot. (S22, Ti)

335-S. Report of Committee B-4 on Electrical Heating, Resistance, and Related Alloys. *American Society for Testing Materials,* Preprint 10, 1952, 38 pages.

Recommended revisions of specifi-

cations, standards, and test methods. Chemical analysis of electronic Ni. Tests for thermionic-emission properties of electron-tube materials, and for sag of tungsten wire. Specifications for high-resistivity, low-temperature-coefficient wire, and for round Cr-Cu wire for electronic devices. (S22, P15, SG-q)

336-S. Spectrophotometric Determination of Titanium With Ascorbic Acid. Edward Hines and D. F. Boltz. *Analytical Chemistry,* v. 24, June 1952, p. 947-948.

Method suitable for the determination of 0.1-25 p.p.m. Ti. Spectrogram and table. 15 ref. (S11, Ti)

337-S. Spectrophotometric Determination of Palladium With Bromide. Gilbert H. Ayres and Bartholomew L. Tuffly. *Analytical Chemistry,* v. 24, June 1952, p. 949-952.

Method which should be especially suitable for analysis of high-Pd alloys. Optimum range is about 40-200 p.p.m. of Pd. Spectrogram and tables. 10 ref. (S11, Pd)

338-S. Attainment of High Resolution in X-Ray Fluorescent Analysis. Ruben M. Brissey. *Analytical Chemistry,* v. 24, June 1952, p. 1034-1035.

A simplified method using a General Electric XRD-3 fluorescent analyzer applicable when elements, such as mixtures of Mo, Cb, Ta, and W, are analyzed. Tables and radiation curves. (S11, Mo, Cb, Ta, W)

339-S. Photometric Determination of Beryllium in Beryllium-Copper Alloys. C. L. Luke and Mary E. Campbell. *Analytical Chemistry,* v. 24, June 1952, p. 1056-1057.

Method for 2% Be-Cu alloys using ethylene-diamine tetra-acetic acid as a masking agent and an aluminon-buffer composite solution. Tables. (S11, Be, Cu)

340-S. Surface Finish. P. E. Dyachenko. *Industrial Diamond Review,* new ser., v. 12, June 1952, p. 111-114. (Reprinted from *Courrier de la Normalisation,* v. 16(87), 1949, p. 279-283.)

Survey of Russian apparatus and procedures for surface-finish measurements. Diagrams, graphs, and illustrations. (S15)

341-S. On the Arc Spectra of Boron, Indium, Thallium, Lead, and Bismuth. H. E. Clearman. *Journal of the Optical Society of America,* v. 42, June 1952, p. 373-379.

Observations were made between 1200-2000 A.
(S11, B, In, Tl, Pb, Bi)

342-S. Miniature Radiography. S. L. Fry. *Metal Industry,* v. 80, June 13, 1952, p. 479-480.

A method of cutting costs of X-ray examination. A small-size photograph is taken of a fluorescent screen the same size as the specimen. (S13)

343-S. A Recording Device for Surface Temperature Measurements. Nobuji Sasaki and Akira Kamada. *Review of Scientific Instruments,* v. 23, June 1952, p. 261-263.

The device itself; the 2-point thermocouple; and the portable thermostat. Diagrams. (S16)

344-S. New Precision Reference Specimens for Surface Finish Control. C. R. Lewis and A. F. Underwood. *Tool Engineer,* v. 29, July 1952, p. 36-40.

Development of a method of standardization of production and distribution of accurate and reproducible physical standards of surface roughness. Design and machining of specimens. Specimens now available commercially. Diagrams and photographs. (S15)

345-S. How Big Is Your Inch? W. D. Russell. *Western Machinery and Steel World,* v. 43, June 1952, p. 99-101.

Standardization in gaging. Advocates use of an area agency for this purpose. Precision Gage Laboratory at Stanford Research Institute. (S14, S22)

346-S. (English.) **Analytical Application of the Absorption Spectra of the Halide Complexes of Heavy Metals. I. Spectrophotometric Determination of Iron With Hydrochloric Acid.** M. A. Desesa and L. B. Rogers. *Analytica Chimica Acta,* v. 6, June 1952, p. 534-541.

12 references. (S11, Fe)

347-S. (French.) **Sorting of Steels by the Spark Method.** Maillet and Couronne. *Circulaire d'Informations Techniques,* v. 9, June 1952, p. 836-843.

The method and its application to the determination of quality of special steels. Results on highly mild, mild, semi-hard, hard, and very hard steels, also those on Mn, Si, Ni, Cr, Ni-Cr, W, and V steels. Micrographs. (S10, ST)

348-S. (German.) **A Rapid Method for Determination of the Chemical Content of Metallurgical Slags by Means of Spectroscopic Analysis.** Gerhard Hartleif and Heinz Kornfeld. *Archiv für das Eisenhuttenwesen,* v. 23, Mar./Apr. 1952, p. 107-110; disc., p. 110-111.

Spectroscopic method for determination of Ca, Fe, Mn, Mg, Al, Ti, V, and Si in furnace slag. Details of the experiments and amount of error. Tables and graphs. (S11, B21)

349-S. (German.) **Testing of Material With Gamma and Beta Rays. I.**

Radioactive Materials and Their Physical Properties. E. A. W. Müller. *Archiv für Technisches Messen,* June 1952, p. 127-130.

On the basis of the literature. Natural and synthetic radioactive materials. Table gives properties of isotopes applicable to testing of materials. 49 ref. (S19)

350-S. (German.) **Industrial Measurement of Elevated Temperatures in Molten Metals Salts, and Slags.** H. v. Zeppelin. *Giesserei,* v. 39, June 12, 1952, p. 287-289.

Relative merits of various methods and apparatus, especially various protective casings, such as quartz, Ni, and water-cooled types. Diagrams. (S16)

351-S. (German.) **Spectro-Analytical Determination of Low Silver Contents in Lead.** W. D. Treadwell, E. Amrein, and A. E. R. Bodmer. *Helvetica Chimica Acta,* v. 35, No. 3, 1952, p. 765-770.

Results of experiments show that aging the Ag-Pb alloys greatly reduces the blackening values and the hardness of the alloys. Observed phenomena are explained and data are charted. (S11, Pb)

352-S. (German.) **Results Obtained by Ultrasonic Testing of Heavy Forgings Using the Impulse-Reflection Method.** Rudolf Schinn and Ursula Wolff. *Stahl und Eisen,* v. 72, June 5, 1952, p. 695-701; disc., p. 701-702.

12 references. (S13, ST)

353-S. (English.) **A Light-Profile Microscope for Surface Studies.** S. Tolansky. *Zeitschrift für Electrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Apr. 1952, p. 263-267; disc., p. 267.

New microscope technique which permits rapid study of topography of metal and crystal surfaces. The technique is a development of the familiar Schmaltz light-cut method and gives profile magnifications of up to 2000X with resolution of the order of 0.25 μ. The method gives topography over a complete area with a single photograph and is easy to use. It is recommended for use for structures which are too coarse for precision interferometry. (S15)

354-S. (German.) **An Indirect Regulator for Electric Furnaces.** Franz Eberhard Wittig. *Zeitschrift für Metallkunde,* v. 43, May 1952, p. 161-162.

Describes and diagrams device mentioned in preceding article. Its limit of error is 1%. The regulator can also be used with the SiC tube furnace. (S16)

355-S. (German.) **Theoretical and Experimental Basis of the Nondestructive Testing of Materials by Means of the Eddy-Current Process. I. The Contact Coil Process.** Fritz Förster. **II. Practical Results and Industrial Applications of the Contact Coil Process.** Fritz Förster and Helmut Breitfeld. *Zeitschrift für Metallkunde,* v. 43, May 1952, p. 163-180.

The process and a device developed on the principle of the contact coil. Detailed data on extent of the measurements, their accuracy, and sensitivity of the device, possibilities of application of the process, and experiences with it in industry. Charts, tables, diagrams, micrographs, and photographs. 16 ref. (S13)

356-S. (German.) **An Interference Process for Investigating Rough Surfaces.** Ernst Zehender. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, May 21, 1952, p. 456-458.

Roughnesses below one micron can be measured by supplementing the interference microscope by the imprint film-immersion process. Diagrams and interference pictures. (S15)

357-S. (Russian.) **Determination of Phosphorus in Steels by the "Steeloscope".** E. S. Kudelia and A. S. Dem'ianchak. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Mar. 21, 1952, p. 397-398.

A method for spectographic analysis of phosphorus in steel and cast iron. (S11, ST, CI)

358-S. The Separation and Analysis of Metallic Carbides From Steel. R. Pemberton. *Analyst,* v. 77, June 1952, p. 287-291; disc., p. 291-292.

A technique for isolating the carbide phase from solutions of highly alloyed steels, and methods for determining the elemental composition of the separated residue. Procedures for determination of C, Mn, Cr, V, Mo, W, Ti, Cr, and Fe in the residue. (S11, AY, C-n)

359-S. Inorganic Chromatography on Cellulose. Part VIII. The Use of a "Compound" Column of Alumina and Cellulose for the Determination of Uranium in Minerals and Ores Containing Arsenic and Molybdenum. W. Ryan and A. F. Williams. **Part IX. The Use of Alumina and Cellulose Adsorbents for the Determination of Thorium and the Simultaneous Determination of Thorium and Uranium in Minerals and Ores.** A. F. Williams. **Part X. The Spectrographic Determination of Micro Quantities of Thorium Separated by Chromatography From Minerals and Ores.** G. W. Kingsbury and R. B. F. Temple. *Analyst,* v. 77, June 1952, p. 293-312; disc., p. 312.

Tables. 19 ref. (S11, U, Th)

360-S. New Standard Consolidates Bolt and Nut Dimensions. *Machine Design,* v. 24, July 1952, p. 129-130.

Lists important changes. With the exception of heavy bolts, head dimensions of all former series of hexagon bolts and cap-screws were consolidated into a single dimensional series. (S22, T7)

361-S. Gauges for Jet Propulsion Unit Turbine Blades. E. J. Pirner. *Machinery* (London), v. 81, July 3, 1952, p. 14-19.

Gages built for Fairchild Engine Div., Fairchild Engine & Airplane Corp., by Daco Machine & Tool Co., Brooklyn, N. Y. (S14)

362-S. Rapid Photometric Determination of Cobalt in Aluminium Alloys Using Nitroso-R-Salt. William Stross and Gertrude Stross. *Metallurgia,* v. 45, June 1952, p. 315-318.

The method of Haywood and Wood for determining Co in steel can be applied to Al alloys with only minor adjustments. An even simpler procedure also has the advantage of enabling the determination of Co to be combined with that of Cu, Ni, and Fe from aliquots of the same metal solution. Calibration graph. 20 ref. (S11, Co, Al)

363-S. Analysis of Silver Solder. R. W. C. Broadbank. *Metallurgia,* v. 45, June 1952, p. 321.

Electrodeposition method for determination of Ag, Cu, Cd, and Zn. First three are deposited from perchloric acid solution. Table. (S11, SG-f, Ag, Cu, Cd, Zn)

364-S. High Speed Photography; Steel Research Tool. R. A. Buchanan, *Steel,* v. 131, July 7, 1952, p. 90-91.

Various applications, including blast-furnace combustion zones, openhearth tapping streams, piercing of seamless tubing, and oil and spray quenching. Recommended photographic technique. (S18, ST)

365-S. (Book) **Inspection and Gauging.** C. W. Kennedy. 502 pages. Industrial Press, Machinery Publishing Co., Ltd., National House, West Street, Brighton 1, England. 65s.

Practically every aspect of inspection is covered. Types of gages and modern inspection equipment, specifications of workpieces, tolerances, and the inspection of special types of workpieces such as screw threads. Quality control, sampling, and process inspection. (S14)

366-S. (Book). **1951 Supplement to Book of ASTM Standards. Part I. Ferrous Metals.** 416 pages. American Society for Testing Materials. 1916 Race Street, Philadelphia 3. $3.50.

Includes 54 standards covering steel piping materials, structural steel and plate, bars and bolting materials, music wire and alloy bars for springs, corrosion and heat resisting steel, metal-coated steel products, cast and malleable iron, and general testing methods. (S22, CI, ST)

367-S. (Book). **1951 Supplement to Book of ASTM Standards. Part II: Non-Ferrous Metals.** 360 pages. American Society for Testing Materials, 1916 Race St., Philadelphia 3. $3.50.

Covers Cu and Cu alloys, Al and Mg alloys for castings, metal powders and products, electrical resistance alloys, materials for radio tubes, thermostat metals, electrodeposited coatings, and general testing methods. (S22, EG-a, SG-g)

368-S. (Book). **1952 SAE Handbook.** 946 pages. 1952. Society of Automotive Engineers, 29 West 39 St., New York 18, N. Y.

Main sections cover steels and iron; nonferrous metals; nonmetallic materials; threads; bolts, nuts, and screws; splines and serrations; bearings; springs; tubing and fittings; electrical equipment; lighting equipment; engines and parts; car, truck, and bus equipment; tractors and earthmovers; and marine equipment. Includes index. (S22)

369-S. An Improved Apparatus for the Differential Thermal Analysis of Minerals. J. J. Theron. *British Journal of Applied Physics,* v. 3, July 1952, p. 216-220.

Circuit diagrams and graphs. 13 ref. (S11)

370-S. The Electrical Laboratory in a Steel Corporation. W. A. Black. *Iron and Steel Engineer,* v. 29, July 1952, p. 95-104; disc., p. 104-105.

How electrical laboratory service can be of value to the steel industry. Applications include gaging, welding, induction, heating, analyses and automatic controlling. (S18, ST)

371-S. A Simple Instrument for Measuring "Surface Truth" of Metal Surfaces and the Amount of Polishing Required. G. E. Gardam. *Journal of the Electrodepositors' Technical Society,* v. 26, 1950, p. 27-34; disc., p. 35-41.

Previously abstracted from Advance Copy 4, 1950; item 209-S, 1950. (S15, L10)

372-S. Fluorescent Ink as an Inspection Tool. *Light Metals,* v. 15, July 1952, p. 234-235.

Use of Glo-Mor fluorescent ink for nondestructive testing. (S13)

373-S. Turbo-Jet Engine Inspection Seeks Perfection. L. N. Cimini and D. C. Brown. *Machinery* (American), v. 58, July 1952, p. 198-203.

Various inspection methods used for the parts of General Electric Co.'s J47 turbojet aircraft engine. (S13)

374-S. Summary of Standard Specifications for Steel Castings. *Materials & Methods,* v. 36, July 1952, p. 121, 123.

Data sheet with standards revised up to Apr. 1, 1952. (S22, CI)

375-S. Spring Failures and Their Causes. (Continued.) F. P. Zimmerli. *Metal Progress,* v. 62, July 1952, p. 84-88.

Concluding part of the 1951 William Park Woodside lecture. Endurance vs. analysis (of carbon and alloy steel); surface defects; corrosion; setting or load loss (with data on carbon, alloy, and stainless steels, brass, and phosphor bronze); improper heat treatment; plating; phosphate coatings; and decarburization. Graphs. (S21, T7, CN, AY, SS, Cu)

376-S. Testing Cemented Carbides. *Metal Progress,* v. 62, July 1952, p. 124, 126, 128, 148. (Condensed from "Methods of Testing Cemented Carbide Compositions" by A. D. Stevens and J. C. Redmond.)

Chemical, physical, metallographic, and X-ray tests. Tool failure, classification of the tools, and the need for more accurate description. Contribution to ASTM Symposium on Testing Metal Powders and Metal Powder Products. (S13, Q general, C-n)

377-S. Meeting on Modern Methods of Checking Dimensional Interchangeability. *Microtechnic* (English ed.), v. 6, No. 2, 1952, p. 69-147.

An address by M. F. Picard, conclusions by P. Nicolau, and the following papers: "Some Examples of the Application of Statistical Control in the Manufacture of Ball Bearings" (Translated from the French), G. Claesson; "Critical Study of Modern Methods of Statistical Control—New Control Methods," R. Cavé; "Preliminaries to the Application of Statistical Control Charts in the Automotive Industry," P. Pommier; "The Control of Quality on Mass-Produced Engineering Parts," J. Loxham; "Automatic Multiple Point Checking in Modern Mass Production," G. Bardet; and "The Use of Comparators for Production," R. Yribarren. Diagrams, tables, charts, and photographs. (S12)

378-S. (German.) **Ultrasonic Image Conversion by Means of a Thermally Produced Color Change.** Hans Heinrich Rust. *Angewandte Chemie,* v. 64, June 7, 1952, p. 308-311.

New technique for ultrasonic radiography (nondestructive testing). Ultrasonic heat of absorption is utilized for image conversion, color changes being produced by "thermochromes". Silver tetra-iodomercurate is applied in a thin layer to acetyl-cellulose foil, thereby producing a highly sensitive ultrasonic "exposure material" analogous to photographic film. (S13)

379-S. (German.) **New Method for the Production of Images in Nondestructive Investigation of Surface Defects of Products.** W. Stauffer and A. Keller. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 18, May 1952, p. 137-148.

The lacquer-film method. Possibilities of application, its importance, and practical execution. Macrographs. (S13, M28)

380-S. (German.) **Length-Measuring Technique.** A. Heiss. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, July 1, 1952, p. 609-615.

Devices for measuring physical dimensions, profiles, angles, cones, and curvatures. 76 ref. (S14)

381-S. (Swedish.) **A Spectrophotometric Method for Determination of Low Carbon Contents.** Per Enghag. *Jernkontorets Annaler,* v. 136, no. 5, 1952, p. 113-123.

Method for metallic materials. After burning the sample in O_2, SO_2 is removed by chromic acid and CO_2 is absorbed in NaOH solution containing a pH indicator. Decrease in concentration of the basic indicator is followed in a spectrophotometer. Alizarine-yellow R is shown to be useful indicator. (S11).

382-S. Optical Comparators Simplify Inspection of Turbine Buckets. *American Machinist,* v. 96, Aug. 4, 1952, p. 104-107. (S14)

383-S. Behavior of Nitrogen and Some of Its Compounds in Steel. H. F. Beeghly. *Analytical Chemistry,* v. 24, July 1952, p. 1095–1100.

Practical methods for determining how much N is combined with a given element. Illustrative examples of the behavior of N during thermal treatment of steels containing Al, Si, and V. The analytical techniques should be helpful in research on reactions of N in steel with Al, Si, Cb, Ti, Ta, V, and Zr and for establishing relationships between composition of steel and its physical properties. They may

find application in analysis of metals such as Ti or Zr. Graphs and tables. 12 ref. (S11, ST, Ti, Zr)

384-S. Photometric Determination of Aluminum in Manganese, Bronze, Zinc Die Casting Alloys, and Magnesium Alloys. C. L. Luke and K. C. Braun. *Analytical Chemistry,* v. 24, July 1952, p. 1120-1122.

Development of a rapid reliable method for determination of Al occurring as a major constituent in Cu, Zn, and Mg alloys. (S11, Al, Cu, Zn, Mg)

385-S. Photometric Determination of Aluminum in Lead, Antimony, and Tin and Their Alloys. C. L. Luke. *Analytical Chemistry,* v. 24, July 1952, p. 1122-1126.

Method applicable to the analysis of the above and also to a wide variety of other ferrous and nonferrous alloys. (S11, Al, Pb, Sb, Sn)

386-S. Colorimetric Determination of Niobium Using Thiocyanate. Allen B. H. Lauw-Zecha, Samuel S. Lord, Jr., and David N. Hume. *Analytical Chemistry,* v. 24, July 1952, p. 1169-1173.

A systematic spectrophotometric study of the reaction between Cb and thiocyanate which led to the development of a rapid spectrophotometric method for determination of microgram quantities of Cb. It is said to be the most sensitive and reproducible colorimetric method yet reported. Graphs and tables. (S11, Cb)

387-S. Optical Determination of the Quality of Metallic Surfaces. J. Elze and H. Grüss. *Engineers' Digest,* v. 13, July 1952, p. 211-212. (Translated and condensed from *Metalloberfläche*).

Previously abstracted from original. See item 184-S, 1952. (S15)

388-S. Proposed Tentative Specifications for Heavy-Walled Carbon and Low Alloy Steel Castings for Steam Turbines. *Foundry,* v. 80, Aug. 1952, p. 187-188.

Data sheet. (S22, CI)

389-S. Use of Ultrasonic Waves for Internal Flaw Detection. *Industry & Welding,* v. 25, Aug. 1952, p. 60, 62.

The Ultrasonoscope of Glass Developments Ltd., London. By using a persistent screen cathode-ray tube and causing the echoes to brighten the trace instead of deflecting it, an "ultrasonic image" is produced which can be examined and interpreted like a radiograph. Claimed to be of special value in weld testing. (S13, K9)

390-S. An Analysis of the Factors in Spectrochemical Microanalysis. J. K. Hurwitz. *Journal of the Optical Society of America,* v. 42, July 1952, p. 484-489.

Micro-analytical apparatus was designed and constructed for study of diffusion in metals and alloys and analysis of segregates and inclusions. Versatility in changing photographic plate and sample speeds was included in the design. Graphs and tables. (S11, N1)

391-S. Spectrochemical Determination of Tantalum and Columbium in 18 Cr—8 Ni Stainless Steel. W. J. Poehlman and R. E. Sarnowski. *Journal of the Optical Society of America,* v. 42, July 1952, p. 489-492.

A spectrographic method for determination of Ta and Cb, in the concentration ranges 0.01-0.40% and 0.30-1.25%, respectively. Includes referee analyses, comparisons, working curves, and standards. (S11, SS, Ta, Cb)

392-S. Progress of Gas Turbine Truck Tests. Henry C. Hill. *SAE Quarterly Transactions,* v. 6, July 1952, p. 395-408; disc., p. 408.

Results of a year of test runs with the experimental gas-turbine-powered motor trucks currently being developed by Boeing. Performance and operating characteristics are compared with those of heavy-duty diesel trucks, including mechanical engine troubles. Blade failures caused by fatigue and thermal shock. Graphs and tables. (S21, Q7, SG-h)

393-S. Optical Gaging Checks 41 Dimensions in 40 Seconds. *Steel,* v. 131, July 28, 1952, p. 78-79.

Accurate mechanical method of inspection for checking a rotor part of an artillery shell booster. Method uses 27 gages and one experienced man. (S14)

394-S. X-Ray Gages Show Crop Point Accurately. *Steel,* v. 131, July 28, 1952, p. 80-81.

Radiant beam provides precise, continuous indication of seamless steel pipe-wall thickness for determining correct crop length. The gages have effected considerable savings in material and labor. (S14, ST)

395-S. Isotopes Aid Weld Inspection. *Steel,* v. 131, Aug. 11, 1952, p. 88-89.

Use of Co^{60} in nondestructive testing at Tonawanda, N. Y., plant of Linde Air Products Co. (S19, K9)

396-S. Temperature Standardization: Big Gains in Research. R. E. Wilson. *Steel,* v. 131, Aug. 11, 1952, p. 90-92.

Work of National Bureau of Standards in extending its tempera-

ture standardization toward extremes of the temperature scale. (S22)

397-S. Accurate Pyrometry and Furnace Control Pays at Douglas. *Western Machinery and Steel World,* v. 43, July 1952, p. 74-77.

Necessity of control in proper heat treating of metals (especially Al), forming in heated dies, and curing of plastic parts to meet aircraft requirements. The precise calibration of control instruments in this work at Santa Monica Div., of Douglas Aircraft Co. (S16, Al)

398-S. Non-Contact Gaging. J. T. Welch. "Proceedings, First Annual Conference on Instrumentation for the Iron and Steel Industry" (Instruments Publishing Co., Pittsburgh), 1951, p. 10-13.

The X-ray gage for measuring thickness of continuous strip, and the air gage for measuring thickness of fabricated parts. Principles, construction details, and numerous applications. (S14)

399-S. An Electronic Control System for Industrial Control Applications. Elwood T. Davis. "Proceedings, First Annual Conference on Instrumentation for the Iron and Steel Industry" (Instruments Publishing Co., Pittsburgh), 1951, p. 14-18.

System provides three control functions—proportional position, automatic reset, and rate control. Example used is a fuel-fired temperature-controlled process, but the system is applicable to any measurable process variable for which there is a primary element with an electrical output. Compares electric and pneumatic controls. Circuit diagrams and photographs. (S18)

400-S. Hydraulic Servocontrols in the Steel Industry. H. Ziebolz. "Proceedings, First Annual Conference on Instrumentation for the Iron and Steel Industry" (Instruments Publishing Co., Pittsburgh), 1951, p. 19-21.

Applications, performance, advantages, and disadvantages of hydraulic servosystems, and a method for obtaining proportional-plus-reset control. Diagrams. (S18, ST)

401-S. Pneumatic Servomechanisms in the Iron and Steel Industry. A. A. Markson. "Proceedings, First Annual Conference on Instrumentation for the Iron and Steel Industry" (Instruments Publishing Co., Pittsburgh), 1951, p. 21-24.

Advantages and limitations of air as a control fluid. Transmission factors associated with pneumatic signals. Typical oil-operated and air-operated servomechanisms are compared; design problems. Diagrams and performances curves. (S18, Fe, ST)

402-S. Radiographic Inspection of Steel Castings. John M. Flanagan. "Proceedings, First Annual Conference on Instrumentation for the Iron and Steel Industry" (Instruments Publishing Co., Pittsburgh), 1951, p. 25-26.

History of radiographic inspection. Compares various radiographic methods in general use. Importance and use of contracts and specifications in radiographic inspection. (S13, CI)

403-S. Methods for Sorting Mixed Metals. Antony Doschek. "Proceedings, First Annual Conference on Instrumentation for the Iron and Steel Industry" (Instruments Publishing Co., Pittsburgh), 1951, p. 26-33.

Methods and instrumentations which have been applied to mixed-metals sorting problems as well as a few methods not commercially available. Diagrams. (S10)

404-S. Comparison of Methods for Measuring Temperature of Molten Metals. J. W. Percy. "Proceedings, First Annual Conference on Instrumentation for the Iron and Steel Industry" (Instruments Publishing Co., Pittsburgh), 1951, p. 33-36.

History, and comparison of immersion thermocouples and blow-tube pyrometers, with special reference to steelmaking. Diagrams. (S16, ST)

405-S. A Thermocouple System for Molten-Metal Temperature Measurement. L. H. Veiock. "Proceedings, First Annual Conference on Instrumentation for the Iron and Steel Industry" (Instruments Publishing Co., Pittsburgh), 1951, p. 36-38.

Construction and operation details of an immersion type Pt—Pt + Rh thermocouple in use at the acid openhearth shop of Heppenstall Co., Pittsburgh. Photographs, diagrams, and graphs. (S16, ST)

406-S. Radiation Pyrometers Control New High-Gradient Heating Process. H. W. Cox. "Proceedings, First Annual Conference on Instrumentation for the Iron and Steel Industry" (Instruments Publishing Co., Pittsburgh), 1951, p. 39-40.

Temperature-control system for the high-speed high-gradient line of 13 furnaces at the Gary plant of National Tube Co. Photo-electric cells actuate the control system as the tubes pass through the furnace. A tachometer generator records line speed. Diagrams. (S16, F26, ST)

407-S. (English.) **Determination of Nitrogen in Steel.** R. H. A. Crawley.

Analytica Chimica Acta, v. 7, July 1952, p. 63-67.

Accuracy of measurement of small amounts of nitrogen in steel by chemical methods is dependent on satisfactory procedures for converting the nitrides into NH_3, and for measuring the NH_3 thus formed. Color intensity is measured on an absorptiometer. (S11, ST)

408-S. (English.) **Measurement of the Thickness of Metal Plate by Ultrasonic Harmonic Method. II. Electronic Operation and Results of a Field Inspection.** Sakae Tanaka. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Apr. 1951, p. 201-208.

Arrangements of the circuit and construction of the apparatus. Use for determination of wall thickness of the penstock at an electric power plant as compared with direct readings obtained by drilling. (S14)

409-S. (French.) **Determination of the Atomic Concentrations of Thorium and Uranium in Minerals by Means of X-Ray Emission Spectrography.** Madeleine Tournay. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, June 23, 1952, p. 2527-2529.

Description of method includes graph. (S11, U, Th)

410-S. (French.) **Study of Platinum—Platinum-Rhodium Thermocouples, and Their Industrial Applications.** Marcel Chaussain. *Fonderie,* June 1952, p. 2955-2970.

Methods for testing Pt wires, their contamination, and their applications in industry for determining temperature of molten steel. Tables, graphs, diagrams, and illustrations. (S16)

411-S. (French.) **Considerations Relative to Determination of Oxygen, and of Inclusions, in Steel.** J. Varetto and L. Lacomble. *Revue universelle des Mines, de la Métallurgie des Travaux publics, des Sciences et des Arts appliqués a l'Industrie,* ser. 9, v. 8, July 1952, p. 270-274.

Various methods, particularly the Gotta method and the vacuum-fusion method. Proposes improvements. (S11, M23, ST)

412-S. (French.) **Spectrographic Determination of Fluorine in Slags.** J. Gillis, J. Eeckhout, and N. Kemp. *Revue universelle des Mines, de la Métallurgie des Travaux publics, des Sciences et des Arts appliqués l'Industrie,* ser. 9, v. 8, July 1952, p. 284-288.

A continuous arc method. Results and range of accuracy. (S11, B21)

413-S. For Faster Non-Destructive Testing: Semi-Automatic X-Ray Equipment. David Goodman. *American Foundryman,* v. 22, Aug. 1952, p. 62-63.

Use of semi-automatic X-ray units coupled with automatic film developers makes speed and quality compatible. (S13)

414-S. Air May Solve Your Gaging Problem. Wm. T. Nystrom. *American Machinist,* v. 96, Aug. 18, 1952, p. 103-105.

Illustrated applications, with emphasis on velocity-type air gages. (S14)

415-S. The Spectrochemical Analysis of Tungsten. C. H. R. Gentry and G. P. Mitchell. *Metallurgia,* v. 46, July 1952, p. 47-51.

Details of recommended procedures. Working curves and tabular data. (S11, W)

416-S. The Photometric Determination of Arsenic and Antimony in Tin. W. C. Coppins and J. W. Price. *Metallurgia,* v. 46, July 1952, p. 52-54.

Method described obviates the necessity of working with large samples. A preliminary separation is necessary for both elements, after which the molybdenum blue method is used for As and the iodo-antimonite complex method for Sb. (S11, As, Sb, Sn)

417-S. Micro-Interferometry for Surface Measurements. R. E. Sugg. *Product Engineering,* v. 23, Aug. 1952, p. 156-157.

Equipment, procedures, and typical results. Comparative photomicrographs and interferograms. (S15)

418-S. Putting Ultrasonics to Work. Boyd Wise and Dale Ensminger. *Product Engineering,* v. 23, Aug. 1952, p. 180-185.

Miscellaneous applications both in and above the sonic range to locate flaws in metals, mix incompatible liquids, cut tough materials, and clean precision machined parts. Equipment and procedures. Includes glossary of ultrasonic terms. (S13, L10)

419-S. Proposed Tentative Specifications for Brazing Filler Metals. *Welding Journal,* v. 31, Aug. 1952, p. 645-650.

Prepared by a subcommittee jointly sponsored by AWS and ASTM. Includes tables of chemical-composition requirements; standard forms and sizes; dimensional tolerances; and solidus, liquidus and brazing-range temperatures. Operating characteristics and usability of each class. (S22, K8, SG-f)

420-S. (Book) **ASTM Specifications for Steel Piping Materials.** 384 pages. 1952. American Society for Testing Mate-

rials, 1916 Race St., Philadelphia 3, Pa. $3.50.

Contains in latest approved form 56 ASTM specifications for carbon and alloy-steel pipe and tubing, including stainless. Materials covered include: pipe used to convey liquids, vapors, and gases at normal and elevated temperatures; still tubes for refinery service; heat-exchanger and condenser tubes; boiler, superheater, and miscellaneous tubes. Includes specifications for castings; forgings and welding fittings; bolts and nuts. (S22, ST)

421-S. (Book) **Isotopes—a Five-Year Summary of United States Distribution.** 451 pages. 1951. U. S. Atomic Energy Commission, Washington, D. C.

A detailed account of isotope utilization during the first 5 years of the Commission's distribution program. Documentary evidence of the value of radioactive and concentrated stable isotopes to modern research and technology in science, medicine, agriculture, and industry. Mainly consists of tables listing institution, worker, isotope, purpose, and status or reference for each use. 1400 ref. (S19)

422-S. (Book) **Proceedings, First Annual Conference on Instrumentation for the Iron and Steel Industry.** 48 pages. 1951. Instruments Publishing Co., 1921 Ridge Ave., Pittsburgh 12, Pa. $2.00.

Eleven papers presented at conference held in Pittsburgh, Mar. 28-29, 1951, on gaging, temperature measurement, inspection and control. Individual papers are separately abstracted. (S16, S18, ST)

423-S. (Book) **Sampling Inspection by Variables.** Albert H. Bowker and Henry P. Goode. 216 pages. 1952. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. $5.00.

Presents a set of plans for sampling inspection where item quality is expressed on a variable basis. In general, these sampling plans and the procedures for their use were developed for the needs of acceptance inspection of raw materials, semi-finished parts, or completed products. (S12)

424-S. Pressed Metal—in Process Control Techniques. Glenn U. Hinds. American Society for Quality Control. "Quality Control Conference Papers, 1952", p. 105-120.

Method used at the Buick pressed metal plant. Provides a working S.Q.C. tool, based on results of case studies and containing sufficient detailed description to enable the establishment of similar procedures in other plants. Photographs and charts. (S12, G1)

425-S. Applicability and Inapplicability of Mil-Std-105A. John W. W. Sullivan. American Society for Quality Control. "Quality Control Conference Papers, 1952", p. 275-279.

A discussion to help government and industry use the "Military Standard Sampling Procedures and Tables for Inspection by Attributes". Refers especially to cases where random sampling cannot be practiced. (S12)

426-S. Quality Control in Precision Manufacture. O. W. Hitchcock. American Society for Quality Control. "Quality Control Conference Papers, 1952", p. 297-303.

A technique used at Scintilla Magneto Div., Bendix Aviation Corp., for controlling the thickness of silver plating on small parts of Te-Cu rod. Chart. (S12, L17, Ag. Te, Cu)

427-S. Narrow Limit Gaging. Ellis R. Ott. American Society for Quality Control. "Quality Control Conference Papers, 1952", p. 321-330.

Experiences with the use of NL gages. Indicates theory to provide a practical basis for applications of the methods. Table and diagrams. (S12, S14)

428-S. Engineering the Inspection of Industrial Processes. Nelson G. Meagley. American Society for Quality Control. "Quality Control Conference Papers, 1952", p. 397-407.

Examines present state of quality control in terms of an engineering approach to the inspection function; and points out some observations regarding the present state of quality-control development. Charts. (S12)

429-S. Quality Control Techniques in the Aircraft Industry. H. Earle Moore. American Society for Quality Control. "Quality Control Conference Papers, 1952", p. 409-417.

Procedures used at McDonnell Aircraft Corp. Covers the 3 m's: material, machines, and man. (S12)

430-S. Quality Control of Steel Manufacture. Richard H. Ede. American Society for Quality Control. "Quality Control Conference Papers, 1952", p. 421-426.

New developments at U. S. Steel Co. Deals especially in application of quality control to heat times and to operation of soaking pits. Charts and table. (S12, D9, ST)

431-S. Polarographic Determination of Iron in Nonferrous Alloys. Louis Meites. *Analytical Chemistry,* v. 24, Aug. 1952, p. 1374-1376.

General method which consists of reduction of Cu to the metal with

amalgamated Zn. Tables. 14 ref. (S11, Fe, EG-a)

432-S. Modern Air Gauging. J. C. Pierce. *Compressed Air Magazine,* v. 57, Aug. 1952, p. 225-226.

Various types of instruments. (S14)

433-S. Natural and Artificial Sources for Gamma Radiography. B. N. Clack. *Engineer,* v. 194, Aug. 8, 1952, p. 195-198.

Requirements as applied to four groups of uses. Preparation of a radiographic source using radon and some of the problems encountered. Diagrams, graphs, and illustrations. (S19)

434-S. Surface Profile Measurement Using the Microscope. S. Tolansky. *Laboratory Practice,* v. 1, p. 193-196.

The technique described can be used with magnifications ranging from 100 to 2000 and resolutions to ¼μ are obtainable. The method is simple to apply, inexpensive, and nondestructive. It has the advantage of giving profiles over an extended area. Typical results. (S15)

435-S. Approximately Equivalent American and British Steel Specifications (Based on Composition). *Materials & Methods,* v. 36, Aug. 1952, p. 135.

(S22, ST)

436-S. From a Metallurgist's Notebook: Cracked Brass Bobbins. *Metal Industry,* v. 81, Aug. 8, 1952, p. 107-108.

A report on the cause of premature failure by cracking of brass bobbins and bobbin protectors. (S22, Q26, Cu)

437-S. How to Check Quality of Surface Finish. *Standardization,* v. 23, Aug. 1952, p. 228-242.

Introduction followed by three articles: "The 'Why' of the Surface Finish Standards", James A. Broadston; "The Use of Standard Roughness Comparison Specimens", Donald E. Williamson; and "The 'Gold Standard' Precision Specimens of Surface Roughness", C. R. Lewis. Diagrams and illustrations. (S15)

438-S. Ultrasonic Techniques: Some Effects and Applications. D. O. Sproule. *Times Science Review,* Autumn, 1952, p. 14-15.

An illustrated review. 16 ref. (S13)

439-S. On Quantitative Determination. I. Principles. II. Errors Caused by Absorbing Particles. III. Multiple Guinier Camera With Adjustable Curved Crystal Monochromator. P. M. de Wolff. "Selected Topics in X-Ray Crystallography From the Delft X-Ray Institutes" (Interscience Publishers, New York), 1951, p. 211-260.

Quantitative analysis using X-ray diffraction techniques. Methods; the systematic error due to absorption in the powder particles; a photographic technique. 28 ref. (S11)

440-S. (German.) Influence of Structure on the Appearance of the Sparks Appearing During Polishing of Unalloyed and Alloyed Steels. Johanna Hunger and Otto Werner. *Archiv für das Eisenhüttenwesen,* v. 23, July-Aug. 1952, p. 277-286.

Dependence of appearance and size of the sparks upon carbon content. The possibility of characterizing the structure of chemically identical unalloyed steels and cast iron from the appearance of the sparks. Tabulated data, micrographs and diagrams. 27 ref. (S10, CN, AY)

441-S. (German.) Structure of Metal Surfaces. (According to New Investigations by Electron Beams.) H. Raether. *Metalloberfläche,* sec. A., v. 6, Aug. 1952, p. A113-A119.

The mechanism of surface analysis by means of electron beams. Results of the investigation on mechanically and electrolytically polished metal surfaces. Electron micrographs and diffraction patterns. 12 ref. (S15, M22)

442-S. (German.) Measurement of Thicknesses by Means of Radiation Methods. *Stahl und Eisen,* v. 72, July 31, 1952, p. 941-947.

Report consists of four articles: "Approximate Measurement of Thicknesses of Less Than 1 Mm. by Means of Beta-Rays", Adolf Trost; "Measurement of Thicknesses of up to Approximately 10 Mm. by Means of X-Rays and a Counting Tube", Hans Werner Fritze; "Measurement of Thicknesses of Approximately 10-100 Mm. by Means of Gamma-Rays and a Counting Tube", Wolfgang Kolb; and "Measurement of the Thicknesses of Nonferromagnetic Layers on Nonferromagnetic Bases by Means of Beta-Rays and a Counting Tube", Rudolf Berthold. Diagrams, graphs, and illustrations. (S14)

443-S. (German.) Significance of Zn as an Alloy in Spectrographic Investigations of the Al-Mg System. Jan Van Calker and Rudolf Wienecke. *Zeitschrift für angewandte Physik,* v. 4, June 1952, p. 210-215.

Results of experiments show that effect of Zn on spectrographic analysis varies with Zn content and various analytical conditions. Graphs. 15 ref. (S11, Al, Mg, Zn)

444-S. (German.) Polarographic Determination of Indium in the Presence of Other Metals, Especially Zinc. Günther Rienäcker and Erhard Hoschek. *Zeitschrift fur anorganische und allgemeine Chemie,* v. 268, Nos. 4-6, 1952,

p. 260-267.

A method of preventing the interfering effect of Cd. This method can also be used to determine In in commercial Zn. Graphs and tables. 10 ref. (S11, In, Zn)

445-S. (German.) **Sampling and Sorting of Metallic Samples.** Josef Blanderer. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 5, July 1952, p. 257-262; disc., p. 262-263.

Mathematical and mechanical problems involved. Practical suggestions for various types of alloys. (S12)

446-S. (Italian.) **Concerning the Gravimetric-Volumetric Determination of Traces of Calcium in Nearly Eutectic Al-Si Alloys.** G. Luft. *Alluminio*, v. 21, June 1952, p. 237-251.

Various methods, and details of satisfactory procedure. Typical data are tabulated and macrographs and micrographs show superficial appearance and microstructure of Al-Si alloys containing Ca_2Si inclusions. 42 ref. (S11, M27, Al)

447-S. (Italian.) **Notes on the Quantitative Spectrographic Determination of Manganese and Silicon in Special Steels.** Mario Ongaro. *Metallurgia Italiana*, v. 44, June 1952, p. 221-225.

Results of experiments on effect of principal alloying elements on spark intensity, variation in excitation of the Mn and Si lines along the discharge section obtained with four different sources, and effect of metallurgical history of the specimen. Recommended sources for determination of Mn and Si in high speed and stainless steels. (S11, TS, SS)

448-S. Sonic Tester Checks Bonding of Honeycomb Panels. H. O. Williams. *American Machinist*, v. 96, Sept. 1, 1952, p. 116-117.

How dancing grains of sand outline unbonded areas of honeycomb panels in new sonic testing device. (S13)

449-S. Determination of Oxygen in Metals and Metal Oxides by the Isotopic Method. A. D. Kirshenbaum and A. V. Grosse. *American Society for Metals*, Preprint 39, 1952. 11 pages.

Quantitative methods for determining O_2 content of metals used at present are long, tedious, and at times not too accurate. The method described uses O^{18} and does not require quantitative separation or recovery of the O_2, thus giving fast results accurately. Accurate O_2 values were obtained with this method for several Cu-O_2 and Fe-O alloys and for Cu and iron oxides. 27 ref. (S11, Cu. Fe)

450-S. The Determination of Some Residual Elements Which Produce Harmful Effects in Magnesium-Treated Nodular Cast Iron. W. Westwood and R. Presser. *British Cast Iron Research Association Journal of Research and Development*, v. 4, Aug. 1952, p. 369-386.

Individual chemical methods of determining presence of Al, Sb, As, Bi, Pb, Sn, and Ti in pig iron. (S11, CI)

451-S. Determination of Iron in Ores, Slags, and Refractories. *Journal of the Iron and Steel Institute*, v. 171, Aug. 1952, p. 392-403.

H_2S reduction procedure for Fe determination is recommended. Confirmation is provided from extended trials on synthetic solutions and oxide-type materials. Tables. (S11, Fe)

452-S. Steel Mill Instrumentation Improves Production and Quality. L. W. Heinzinger. *Journal of Metals*, v. 4, Sept. 1952, p. 919-921.

Instruments used include bath thermocouple, optical pyrometer, and magnetic carbon analyser. (S16, S11, ST)

453-S. Mass Spectrometer; New Technique for Analysis of Metals. *Metal Industry*, v. 81, Aug. 22, 1952, p. 149-150.

New procedure developed by Gorman, Jones and Hipple of National Bureau of Standards. (S11)

454-S. The Low Down on Air Gaging. C. W. Kennedy. *Modern Machine Shop*, v. 25, Sept. 1952, p. 230-232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256.

Operating principle, use, and care of air gaging equipment. Diagrams and photographs. (S14)

455-S. Radioactive Isotope Dilution Method for Determining Sulfate Concentration in Chromium Plating Baths. Stanley L. Eisler. *Plating*, v. 39, Sept. 1952, p. 1019-1023, 1031.

See abstract "Determination of Sulphate in Chromium Baths Using Radiobarium." *Metal Finishing*, item 83-S, 1952. (S11, L17)

456-S. (Japanese.) **Studies on the Surface Roughness of Metals Finished by Cutting.** Norio Takenaka. *Report of the Institute of Industrial Science, University of Tokyo*, v. 1, No. 6, Mar. 1951, p. 170-206.

Investigation on effect on surface roughness of shape of tools and cutting conditions, mechanism of roughness due to built-up edges, and characteristics of surface roughness of several metals, in order to get a practical basis for selecting proper shape of tools and cutting condi-

tions to finish metals to desired roughness. Graphs, diagrams, and profilograms. 22 ref. (S14, G17)

457-S. Safety of Welded Ships. *Times Review of Industry,* v. 6, June 1952, p. 22-24.

Different types of fractures taking place in iron and steel welding and the underlying conditions promoting these structural failures. (S21, K general, CN)

458-S. Portable X-Ray Speeds Wind Tunnel Check. *Western Metals,* v. 10, Aug. 1952, p. 42-45.

Development of new X-ray unit for testing welds in the steel plate of which the Cal Tech wind tunnel is fabricated. (S13, ST)

459-S. (French.) Comparison of Qualities of the Unalloyed Steels Used for Making Screws and Other Joining Members in Different Countries. G. Trichon. 4th International Mechanical Engineering Congress, June 1952, 11 pages.

Explains how screws, nuts, and rivets are made; necessary qualities of the material. Different designations of bolt-making steels. Tables and summary of the symbols concerning special properties. heat treatment, method of manufacture, etc. Universal symbolization of metals. (S22, G10, CN)

460-S. (French.) The Standardization of Iron and Steel Industry Products and the Problem of Supplies. H. Meriel-Bussy. 4th International Mechanical Engineering Congress, June 1952, 19 pages.

Analyzes French standards for nonalloy steel. These standards are primarily related to the mechanical characteristics of these steels. Work on simplification in France by the A.U.P.S. As an example, reference is made to semifinished forgings. World unification and simplification of steel standards and quality. Tables. (S22, ST)

461-S. (French.) Measurement of Temperatures in the Casting of Copper Alloys. Albert Blondel. *Fonderie,* July 1952, p. 3007-3022.

Various types of thermocouples, their insulation, electrical measuring instruments, and optical and radiation pyrometers. Experiments for the comparative study of the various devices. Graphs, diagrams, and photographs. 18 ref. (S16, E10, Cu)

462-S. (German.) Principles and Recommendations for Standardization of Test Methods. E. Brandenberger. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 18, July 1952, p. 233-238.

Summary of discussion at meeting of SVMT, May 23, 1952. (S22, Q general)

463-S. The Polarographic Determination of Titanium in Steels and Nickel-Base Alloys. R. P. Graham, A. Hitchen, and J. A. Maxwell. *Canadian Journal of Chemistry,* v. 30, Sept. 1952, p. 661-667.

Removal of interferences, apparatus and reagents, method of analysis, and applications. 25 ref. (S11, Ti, ST, Ni)

464-S. A Lock Nut and Nut Fatigue Testing Machine. *Engineer,* v. 194, Aug. 29, 1952, p. 284-285.

Machine developed for testing bolt and nut assemblies under vibration; and working at predetermined frequency, amplitude, and intensity of vibration, is designed to give in minutes and seconds ratio of efficiency to be expected from different bolts and nuts in any application. Diagrams. (S21, Q7)

465-S. Simple Tramp Iron Detector Effective at Lower Cost. C. M. Marquardt. *Engineering and Mining Journal,* v. 153, Sept. 1952, p. 96-98.

Advantages of an electronic device for mine and mill work known as the Detramp. (S10, B12, B13)

466-S. Meeting Critical Specs. Tom Hurt and F. B. McCoy. *Instrumentation,* v. 6, 3rd qtr., 1952, p. 32-33.

Temperature measurement and control in aluminum processing at Sheffield, Ala., plant of Reynolds Alloy Co. Mainly for heat treatment operations. (S16, J general, Al)

467-S. Carbon and Alloy Tool Steels; Problems of Standardization. H. Carr. *Iron & Steel,* v. 25, Sept. 1952, p. 401-405.

Concludes that some form of standardization is really necessary but must be supplemented by other more complex physical specifications. The Jominy hardenability test. Tables and graphs. 11 ref. (S22, J26, TS)

468-S. Cobalt-60 for Testing Castings. *Railway Age,* v. 133, Sept. 15, 1952, p. 76-77.

Southern Pacific finds new method of nondestructive testing effective and much cheaper than radium or X-ray equipment. (S13)

469-S. Statistical Evaluation of Rational and Stratified Methods of Sampling. Parts I and II. James V. Strela. *Tool Engineer,* v. 29, Aug. 1952, p. 37-40. Sept. 1952, p. 61-66.

Fundamentals of sampling in general and of two specific methods in particular. The methods are statistical; their logic rather than their mathematical basis is emphasized. The Thompson Sampling Machine

and its operation. (To be continued.) (S12)

470-S. (Dutch.) **Several Simple Methods of Nondestructive Testing of Defects in Materials.** J. Van Nieukoop. *Metalen,* v. 7, Aug. 15, 1952, p. 247-254.

A review. Diagrams, photographs, and graphs. 12 ref. (S13)

471-S. (French.) **Measurement of the Temperature of Molten Steel.** (Continued.) P. Devilder. *Métallurgie et la Construction Mécanique,* v. 84, July 1952, p. 505-507.

Various types of indicating and recording equipment. (S16, ST)

472-S. (Pamphlet.) **Manual of Analytical Methods for the Determination of Uranium and Thorium in Their Ores.** New Brunswick Laboratory, U. S. Atomic Energy Commission, Sept. 1950, 55 pages. (For sale by Supt. of Documents, U. S. Govt. Printing Office, Washington 25, D. C.) 20c.

(S11, U, Th)

473-S. (Book.) **Mechanical Measurements by Electrical Methods.** Ed. 2. Howard C. Roberts. 357 pages. 1951. Instruments Publishing Co., 921 Ridge Ave., Pittsburgh, Pa.

No extensive revision. Part I: Basic principles of circuits and systems and their abilities and applications. Part II: Possibilities of the art and physical forms of the equipment employed in realizing these possibilities. Five chapters deal with gaging methods. 330 ref. (S14)

474-S. (Book.) **Quality Control Conference Papers, 1952.** 452 pages. American Society for Quality Control, New York. $3.50.

Papers presented at the 6th annual convention, American Society for Quality Control, May 22-24, 1952, Syracuse, New York. Subjects relate to industries such as chemical, metallurgical, electrical, aircraft, food, automotive, textile, and pulp and paper; accounting and mathematical aspects; military standards, psychology; etc. Papers of metallurgical interest are separately abstracted. Tables, charts, photographs, and references. (S12)

475-S. (Pamphlet.) **Sampling and Analysis of Tin Ingots.** J. W. Price. *Tin Research Institute* (England), Aug. 1951, 5 pages. Gratis.

Details of recommended procedures. (S11, Sn)

476-S. (Book.) **Steelwork in Building.** William Basil Scott. E. & F. Spon, Ltd., 22 Henrietta St., London. W.C.2, England. 25s.

Described as "A Commentary on the British Standard Specification on the Use of Structural Steel in Building Printed With the Specification." Based on the revised British Standard (No. 449: 1948), on which the new section tables issued by the steel manufacturers are based. (S22, T26, CN)

477-S. Ultrasonic Survey of Riveted Drums. W. W. Campbell and R. H. Murfitt. *Journal of the Institute of Fuel,* v. 25, Sept. 1952, p. 190-195, disc., p. 196-197.

Use for detecting cracks between rivet holes of shell plates of riveted drums, where presence of butt straps preclude use of other methods. Radiation is introduced into seam from accessible internal or external surface of plate and is reflected from cracks. Location and extent of cracks can be observed. Diagrams and photographs. (S13)

478-S. The Study of Surfaces by Multiple-Beam Interferometry. O. S. Heavens. *Laboratory Practice,* v. 1, Sept. 1952, p. 249-252.

Method of studying surface topography by multiple-beam Fizeau fringes is outlined. Interpretation of a typical contour pattern from a mica crystal. Method has great power for distinguishing fine detail of a surface. Diagrams. (S15)

479-S. Various Gages for Inspecting Diameter of Under-Cut Bores. Robert Mery. *Machinery* (American), v. 59, Sept. 1952, p. 176-179.

Some gages designed by the author. (S14)

480-S. The Metallurgist's Role in the Interpretation of Non-Destructive Testing. S. L. Henry. *Non-Destructive Testing,* v. 11, July 1952, p. 16-20.

Procedures for evaluation of nondestructive testing. Five specific cases with method and results of examination. Methods included magnetic particle inspection, radiographic, and ultrasonic. Micrographs. (S13)

481-S. Units Used in Industrial Radiography to Describe Strength of Cobalt-60 Sources. J. Kastner. *Non-Destructive Testing,* v. 11, July 1952, p. 21-23.

Purpose was to examine above units and to point out factors which must be taken into account before source strengths expressed in different ways may be compared. (S13, Co)

482-S. A Preliminary Report on the Picker-Polaroid Process in Industrial Radiography. J. A. Reynolds. *Non-Destructive Testing,* v. 11, July 1952, p. 24-27.

Actual and potential applications of the above process for medicinal and industrial X-ray equipment. Useful in nondestructive investigation. (S13)

483-S. Photoelectric Scanning of Fluorescent Indications. S. A. Wenk, K. D. Cooley, and R. M. Kiminel. *Non-Destructive Testing,* v. 11, July 1952, p. 28-31.

Development of a means for automatic scanning of indications such as are produced by the magnetic particle and penetrant methods. (S13)

484-S. (German.) **Analytical Chemistry as a Metallurgical Tool.** Walter Koch. *Stahl und Eisen,* v. 72, Aug. 28, 1952, p. 1056-1063.

Research tasks; trace elements in iron, their chemical combination and analytical determination; the deoxidation reaction; and deoxidation and combination of nitrogen. 10 ref. (S11)

485-S. Photometric Determination of Zirconium in Magnesium Alloys. Glenn B. Wengert. *Analytical Chemistry,* v. 24, Sept. 1952, p. 1449-1451.

Photometric alizarin red S method which gives accuracy equal to or better than the gravimetric procedures. Graphs and tables. (S11, Mg, Zr)

486-S. Colorimetric Determination of Silver With ρ-Dimethylaminobenzalrhodanine. G. C. B. Cave and David N. Hume. *Analytical Chemistry,* v. 24, Sept. 1952, p. 1503-1505.

Effect of variables, procedure, and experimental data. (S11, Ag)

487-S. Nondestructive Testing. Samuel A. Wenk. *Battelle Technical Review,* v. 1, Sept. 1952, p. 98-102.

General introduction and specific methods of testing: light, radiography, magnetic and electric tests, magnetic-particle testing, magnetic analysis, cyclograph, reflection, resonant-frequency, and penetrant tests. (S13)

488-S. Radioactive Isotopes: Their Properties and Uses in the Steel Industry. Graham Oldham. *British Steelmaker,* v. 18, Sept. 1952, p. 460-467.

Relationship to natural radioactive elements, nuclear charge of atom, use of half-life period, detection, counting and particles, history, P in Fe and slag, desulfurization theory, burden transit time, blast furnace-lining wear, segregation in steel, and handling. (S19)

489-S. How Statistical Quality Control Can Help You. D. H. W. Allan. *Canadian Metals,* v. 15, Sept. 1952, p. 48, 50.

Analysis of past data, process control, and sampling inspection. (S12)

490-S. Ultrasonic Detector Reveals Flaws. W. J. Stirling. *Canadian Metals,* v. 15, Sept. 1952, p. 58, 60, 62-63.

Use for testing metallic materials and equipment. (S13)

491-S. The Formulation and Interpretation of Steel Castings Specifications. Edwin Gregor. *Edgar Allen News,* v. 31, June 1952, p. 145-147; July 1952, p. 177-178; Aug. 1952, p. 200-201; disc., p. 201; Sept. 1952, p. 224-225.

(S21, CI)

492-S. Pneumatic Gauging Applied to the Measurement of Surface Finish. M. Graneek and H. L. Wunsch. *Engineer,* v. 194, Sept. 1952, p. 387-389.

Details of a special design of measuring jet suitable for examination of both flat and cylindrical surfaces. Results obtained with pneumatic comparator on a series of ground and turned surfaces having different grades of finish showed that a reasonably linear relation existed between corresponding centerline average readings. (S14)

493-S. Your Quality Control Program—Is It Effective? Kenneth MacKay Smith. *Foundry,* v. 80, Oct. 1952, p. 188, 190, 192-193.

Over-all functions of quality control, rather than detailed technical devices necessary in program's operation. (S12)

494-S. How to Select and Use Films for Weld Radiography. Jay Bland. *Industry & Welding,* v. 25, Oct. 1952, p. 78-82, 148-149.

Film processing, sensitivity, radiation wave lengths, gamma-ray procedure, and weld radiographs of arc welding. Diagrams. (S13, K1)

495-S. Dip and Etch Simplify Aluminum Forging Inspection. Alfred H. Pope. *Iron Age,* v. 170, Oct. 2, 1952, p. 102-103.

Alkaline etch and HNO_3 treatment used at Alcoa's Cleveland plant. Lubricant smut is evenly removed from forging surface to leave a bright finish, but discoloration remains in cracks and discontinuities caused by metal overlapping during forging. (S13, F22, Al)

496-S. Metallurgical Tips for the Maintenance Man. M. V. Herasimchuk. *Iron and Steel Engineer,* v. 29, Sept. 1952, p. 73-80, disc., p. 81-83.

A few basic principles underlying steel-mill equipment failures show that design factors and metallurgical factors are distinct in their effects, yet often overlap, and that relatively minor design or metallurgical changes will produce effective results. 14 ref. (S21, ST)

497-S. Inorganic Chromatography on Cellulose. Part XII. The Quantitative Determination of Tantalum and Niobium in Complex Minerals, Ores, and Synthetic Materials. A. F. Williams. *Journal of the Chemical Society,* Aug. 1952, p. 3155-3163.

Previously reported method modified to permit Cb to be extracted free from Ti, Sn, and Zr. Tables. (S11, Ta, Cb)

498-S. A Stoichiometric Combustion Method for the Determination of Sulphur in Slags. C. J. B. Fincham and F. D. Richardson. *Journal of the Iron and Steel Institute,* v. 172, Sept. 1952, p. 53-55.

The slag is melted in a stream of CO_2, and the SO_2 produced is measured. Accuracy claimed is $\pm 2\%$. Analysis time is 30 min. for both open-hearth and blast-furnace slags. (S11)

499-S. X-Ray Spectroscopy as a Control Method in the Production of Zirconium and Hafnium. D. M. Mortimore and P. A. Romans. *Journal of the Optical Society of America,* v. 42, Sept. 1952, p. 673-677.

Above analysis made in range of concentrations from 0.5 to 99.5% Hf in Zr. Method makes use of newly perfected X-ray fluorescence analysis equipment incorporating a Geiger tube together with associated scaling and recording circuits for measurement of intensities. Diagram, graphs, and tables. (S11, Zr, Hf)

500-S. An Ultrasonic Flaw Detector for Non-Destructive Testing. *Machinery Lloyd* (Overseas Ed.), v. 24, Sept. 13, 1952, p. 78-81, 83, 85, 87-88.

Transmission and echo sounding methods, indicating relative merits. Details of British apparatus employing latter principle. (S13)

501-S. Where Radioisotopes are Finding Industrial Use. Philip O'Keefe. *Materials & Methods,* v. 36, Sept. 1952, p. 87-89.

Radioisotopes are useful in thickness gages, for wear tests, in radiography corrosion experiments, and in surface-cleaning tests. Brief description of radiation sources and tracers. (S19)

502-S. Measurement of Transient Surface Temperatures. Robert A. Huggins, Bob Roll, and Harry Udin. *Review of Scientific Instruments,* v. 23, Sept. 1952, p. 467-470.

Design, construction, and operation of apparatus to produce, measure, and record transient surface temperature cycle of type produced at and near a typical spot weld. Diagrams and graphs. (S16, K3)

503-S. Strip Width Held to Close Limits. Glenn R. Petersen. *Steel,* v. 131, Sept. 29, 1952, p. 94, 97.

Noncontacting steel mill width gage measures deviations as small as 1/64-in. over a range of 10 to 96 in. Increases tonnage of usable material. (S14, ST)

504-S. New Spectrochemical Excitation Unit: A Key to Essential Control in Boron Steels. J. T. Rozsa and L. E. Zeeb. *Steel,* v. 131, Oct. 6, 1952, p. 92, 94, 97.

Unit provides a rapid, accurate method for determination of boron in trace amounts in alloy steels. Photograph and diagram. (S11, AY)

505-S. Internal Hydrostatic Pressure Testing as a Measure of the Performance Values of Oil Well Casing and Tubing. H. G. Texter. *Third World Petroleum Congress, Proceedings,* Sec. II, 1951, p. 1-19; disc., p. 19-23.

Argues that requirements of A.P.I. casing and tubing specifications do not insure that the products will withstand forces to which they are subjected. Resistance to these forces is expressed as performance values. Compliance with specifications only indirectly proves worth of the product. Only the mill-inspection hydrostatic test is a direct proof of quality, and it does not go far enough. Reasons for believing that defects are not focal points for corrosion. Proof testing of each length is recommended. Typical defects and failures are illustrated. (S13, ST)

506-S. "Cumulative Sampling" Boosts Shop Output 22%. Clyde H. Latter. *American Machinist,* v. 96, Sept. 29, 1952, p. 95-97.

"Cumulative sampling" process at San Diego plant of Solar Aircraft Co. Process control and acceptance sampling are combined in single, easy-to-operate system. Scrap and rework are down 33%. (S12)

507-S. Comparative Specifications for Alloy Steels. *Materials & Methods,* v. 36, Oct. 1952, p. 153, 155, 157.

Lists composition specifications: U. S. military, U. S. Army, U. S. Navy, U. S. Army-Navy aeronautical, and Federal. (S22, AY)

508-S. Sources and Identifying Symbols of Government Specifications. Sherman F. Booth. *Metal Progress,* v. 62, Oct. 1952, p. 109-114.

Principal sources from which specifications may be obtained and identifying symbols used by different agencies. (S22)

509-S. Nondestructive Testing: Quality With Fewer End-Product Failures. Samuel A. Wenk. *Steel,* v. 131, Oct. 13, 1952, p. 158-160, 163.

Surveys various methods used to detect and evaluate defects, or to predict strength and serviceability of parts. Purpose, underlying principles, and limitations. (S13)

510-S. A Semiquantitative Spectrographic Method for the Analysis of

Minerals, Rocks, and Ores. C. L. Waring and C. S. Annell. *U. S. Geological Survey* (For U. S. Atomic Energy Commission), TEI-143, Feb. 1951, 23 pages.

The method described determines 55 elements in one arcing of a 10-mg. sample, requires a minimum of sample handling thus reducing chances of contamination, detects low concentrations of elements, and is rapid. It has been used to complete 15,000-20,000 determinations during a 9-month period. (S11)

511-S. A Spectrographic Method for Determining Trace Amounts of Lead in Zircon and Other Minerals. C. L. Waring and Helen Worthing. *U. S. Geological Survey* (For U. S. Atomic Energy Commission), TEI-216, March 1952, 14 pages.

The method is applicable to samples containing 0.5-1000 ppm. Pb with an estimated accuracy of 6-10%. No chemical separations or concentrations are required. Other minerals tested were apatite, spene, microlite, allanite, and perthite. (S11, Pb)

512-S. (Book.) The Measurement and Control of Temperatures in Industry. R. Royds. 260 pages. Chemical Publishing Co., Inc., 212 Fifth Ave., New York 10, N. Y. $5.00.

Latest developments in temperature measurement and control in various industries. Equipment available in each particular range. Standardization and automatic control. (S16)

513-S. Fire Assay for Osmium. W. J. Allan and F. E. Beamish. *Analytical Chemistry,* v. 24, Oct. 1952, p. 1569-1572.

Experimental data and results on efficiency of fire assaying show that fusion results in formation of an unusually stable form of osmium. (S11, Os)

514-S. Microdetermination of Osmium. W. J. Allan and F. E. Beamish. *Analytical Chemistry,* v. 24, Oct. 1952, p. 1608-1612.

Method for colorimetric determination of Os by thiourea. It is useful for determination of from 80 micrograms of Os in 200 ml. to 5 mg. in 1 liter with a relative error of 5%. This method is said to be the first application of organic reagents for determination of Os. 14 ref. (S11, Os)

515-S. The Non-Destructive Investigation of Surface Defects. W. Stauffer and A. Keller. *Escher Wyss News,* v. 23-24, 1950-51, p. 98-101.

Various methods used by the Escher-Wyss organization. Typical results obtained with the lacquer-replica process with surface defects rendered visible by various methods. (S14)

516-S. Ultrasonic Inspection; Its Application in the Production of Cast Rolls. E. B. Ellis. *Iron & Steel,* v. 25, Oct. 1952, p. 429-432.

Reflection method of employing ultrasonic waves. Photographs and diagrams. (S13, CI)

517-S. A Description of the Arc and Spark Spectra of Rhenium. William F. Meggers. *Journal of Research of the National Bureau of Standards,* v. 49, Sept. 1952, p. 187-216.

Description was obtained by using solid Re electrodes and conventional arcs or sparks, photographing spectra with the aid of large spectrographs containing concave gratings, and measuring wavelengths of spectral lines relative to secondary standards in spectrum of iron. Extensive table. 24 ref. (S11, Re)

518-S. Hot Radiography Cuts Weld Inspection Time. Alexander Gobus. *Steel,* v. 131, Oct. 27, 1952, p. 72-73.

Apparatus and technique. Comparison with other techniques in relation to time and accuracy. (S13, K9)

519-S. High Temperature Thermocouples. H. A. Wilhelm, H. J. Sveo, A. I. Snow, and A. H. Danne. *U. S. Atomic Energy Commission,* AECD-3275, June 29, 1948, 8 pages.

Preparation, calibration, and performance. Data especially for the Ta-W and Cb-W thermocouples. Latter proved best—for temperatures up to about 2000° C. Graphs. (S16)

520-S. Regulating Systems for the Steel Industry. W. R. Harris. *Westinghouse Engineer,* v. 12, Nov. 1952, p. 187-194.

Regulation of continuous mills and processing lines in steel industry. Examples can be found in electrolytic tinning lines; continuous pickling and galvanizing lines; also blooming, slabbing, or plate mills. Graphs, diagrams, and photographs. (S18, L12, L16, L17, F23, ST)

521-S. Spectrographic Copper Standards. D. M. Smith. *Spectrochimica Acta.* v. 5, July 1952, p. 1-4.

Three graded series of "Matthey" copper standards are in course of preparation, intended to cover ranges 0.05%-0.0001% of Al, Sb, Bi, Cr, Ga, Pb, Ag, Sn (Series A), Co, Fe, Mn, Ni, Si (Series B), and 0.05%-0.001% of As, Be, P, Se, Te, Zn (Series C). Satisfactory checks have been obtained in the case of Bi, Ag, Sn, Co, and Mn; and investigation of remaining elements is in progress. (S11, Cu)

522-S. (German.) **Spectrographic Analysis of Nickel-Cobalt Alloys in the Range From 0-100%.** W. Seith and A. Kottmann. *Spectrochimica Acta,* v. 5, July 1952, p. 36-40.

Spectrographic analysis may be extended to whole range of Ni-Co system when purpose of analysis is the determination of diffusion coefficient of solid metals. Samples of about 20 mg. from successive layers of metal were analyzed. Data are tabulated. (S11, Ni, Co)

523-S. (German.) **Observations of the Sensitivity of Spectroscopic Detection of Impurities in Lead.** Enrico Arreghini and Tullio Songa. *Spectrochimica Acta,* v. 5, July 1952, p. 114-123.

Impurities in Pb were grouped according to Hume-Rothery's rules. In one class, sensitivity follows the order of the heats of vaporization. Position of the ultimate lines is the controlling factor in the other group. 39 ref. (S11, Pb)

524-S. (Italian.) **Spectrochemical Determination of Silicon in Cast Iron and Observation of the Corresponding Microstructure.** M. S. Rosetta. *Spectrochimica Acta,* v. 5, July 1952, p. 77-86.

Determinations using a spark source and quartz spectrograph of medium dispersion. Comparison of effect on spectrochemical results of diameter of cast electrodes. This is partially explained by variations in microstructure of cast rods; pearlitic structure is to be preferred. (S11, M27, CI)

525-S. (Italian.) **Observations of the Spectrographic Analysis of Cast Iron.** R. Berta and A. Palisca. *Spectrochimica Acta,* v. 5, July 1952, p. 87-96.

Cast pencil electrodes were found to be superior for determining Si in cast iron. Chemical and spectrographic analyses are compared. (S11, CI)

526-S. (Italian.) **The Use of Spectrochemical Analysis for Direct Reading With the Quantometer for Production Control of Special Steel.** Lino Benussi and Alessandro Caroli. *Spectrochimica Acta,* v. 5, July 1952, p. 97-113.

Use of the quantometer in steel analysis. Tables illustrate arbitrary correction factors for each element. The advantages of quantometer control. (S11, AY)

527-S. (German.) **The Use of Gamma-Ray Emitting Isotopes in Nondestructive Materials Testing.** Hugo Juvan. *Berg- und Hüttenmännische Monatshefte der Montanistischen Hochschule in Leoben,* v. 97, Sept. 1952, p. 165-176.

Brief review of history, followed by discussion of different radioactive materials and isotopes and principles of using them in radiography. Various instruments are illustrated. Data are graphed and tabulated. 11 ref. (S19)

528-S. (German.) **Determination of the Thickness of Metal Deposits on Aluminium by Means of Chemical Stripping.** W. Wiederholt and B. Kaspras. *Metall,* v. 6, Sept. 1952, p. 509-511.

Determination of the thickness of Cr, Ni, Cu deposits on Al and Al alloys by means of fuming HNO_3 with small additions of chloric acid or potassium chlorate. Advantages and results of the method. (S14, L17, Al, Cr, Ni, Cu)

529-S. (German.) **Radiographic Thickness Measurement of Electrodeposits With the Aid of a Counting Tube Interference Goniometer.** V. Gerold. *Zeitschrift für angewandte Physik,* v. 4, July 1952, p. 247-254.

New method eliminates the disturbing effect of the surface texture of the plated metal on X-ray results. Diagrams, tables, and graphs. 13 ref. (S14)

530-S. (Italian.) **The Possibility of Use of Gamma Rays in Radiography of Light Metals.** M. Robba. *Alluminio,* v. 21, no. 4, 1952, p. 352-362.

Development of satisfactory method, based on control of the relationship between diffused and absorbed radiation. Graphs, tables, and radiographs. (S13, Al, Mg)

531-S. (Italian.) **Discussion of Symbols for Steels, and of Their Standardization in Italy.** G. Zanini ZaZinovich. *Revue de Métallurgie,* v. 49, Aug. 1952, p. 573-582; disc., p. 582-584.

Symbols for commercial, ordinary, and high-quality steels. Italian and French symbols and compositions are tabulated. (S22, ST)

532-S. (Russian.) **New Standards for Steel Articles for Electrical Equipment.** D. V. Krotkov. *Electrichestvo,* Mar. 1952, p. 75-77.

New specifications for "Multiple-Strand Steel Wires for Overhead Electrical Transmission Lines" and "Electrodes for Arc Welding". (S22, T1, K1, ST)

533-S. Inorganic Chromatography on Cellulose. Part XIII. Determination of Tantalum and Niobium in Low-Grade Phosphatic and Siliceous Ores. R. A. Mercer and A. F. Williams. *Journal of The Chemical Society,* Sept. 1952, p. 3399-3403. (S11, Ta, Cb)

534-S. Sampling of Liquid Steel for Dissolved Oxygen. G. F. Huff, G. R. Bailey, and J. H. Richards. *Journal of Metals,* v. 4, Nov. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194,

1952, p. 1162-1165; disc., p. 1165-1167.

An improved bomb-sampling technique for obtaining samples for oxygen analysis from liquid steel. Analyses of samples taken from open-hearth furnaces by improved method show sufficient agreement with laboratory data to indicate that accuracy of method is better than that of other sampling methods. Photographs and graphs. (S11, ST)

535-S. Electric Brains Expand Steel's Muscle. W. R. Harris. *Steel,* v. 131, Nov. 3, 1952, p. 106, 108, 110, 115; v. 131, Nov. 10, 1952, p. 112, 114, 117, 120, 122, 124, 126.

How automatic regulating systems for main and auxiliary mill drives get more tonnage from existing equipment through higher operating speeds. Use in tandem cold reduction mill, and blooming or slabbing mill. Second part: Examples of problems that must be solved when applying drives to steel mill machinery. (S18, F23, ST)

536-S. Practical Ultrasonic Material Testing. W. Felix. *Sulzer Technical Review,* no. 2, 1952, p. 19-31.

The Hughes unit employed by Sulzer Bros., and practical procedure followed. Possibilities and limitations inherent in interpretation of flaw indications by this method, with special reference to intensity ratio between flaw echo and bottom echo and to the usefulness of absorption phenomena observed during multiple reflection as a means of determining material properties. A few special applications of ultrasonic testing, such as examination of welds, testing of adhesion between shells and white-metal linings of bearings, and inspection of shrink fits. Diagrams, graphs, and photographs. (S13)

537-S. A Semiquantitative Spectrographic Method for the Analysis of Minerals, Rocks, and Ores. II. C. L. Waring and C. A. Annell. *U. S. Atomic Energy Commission,* TEI-215, Feb. 1952, 28 pages.

Scope of method previously described for determination of 55 elements has been increased to 68 elements which can be estimated in one exposure of a 10-mg. sample. Lists 336 chemical analyses that indicate approximately 8% disagreement. Extensive tables. (S11)

538-S. (German.) **Experiences With the Magneto-Inductive Testing of Bar Steel for Cracks.** Hans Beuse and Herbert Koelzer. *Archiv für das Eisenhüttenwesen,* v. 23, Sept.-Oct. 1952, p. 363-367; disc., p. 367.

Adequacy of this inspection method depends on elimination of all external disturbing influences. Its success and limitations, individually discussed, point to the need of further research on magneto-inductive testing. (S13, ST)

539-S. Compressor-Blade Inspection. *Aircraft Production,* v. 14, Nov. 1952, p. 381-387.

High-speed, multidimensional equipment incorporating air gages of adjustable sensitivity. Diagrams and photographs. (S13)

540-S. Magnetic Sorting. *Aircraft Production,* v. 14, Nov. 1952, p. 389-391.

Application and interpretation of bridge-type instrument. Diagrams and photographs. (S10)

541-S. How Round is Round? Albert C. Sanford. *American Machinist,* v. 96, Nov. 1952, p. 124-126.

How out-of-roundness is measured and why it cannot be measured by conventional methods. Gages illustrated. (S14)

542-S. The Polarographic Determination of Titanium in Aluminium Alloys. R. P. Graham and A. Hitchen. *Analyst,* v. 77, Oct. 1952, p. 533-537.

Compares results with those obtained by other methods. 11 ref. (S11, Ti)

543-S. Strain Gage Transducers for Measurement and Control. R. J. Fyffe. and A. Arobone. *Product Engineering,* v. 23, Nov. 1952, p. 121-148.

Bonded and unbonded gages, types of bridge circuits, amplifying and recording equipment, different types of transducers designed specifically for measuring pressure flow, weight, and displacement. Case histories illustrate unusual applications. Tables, diagrams, and photographs. (S18)

544-S. Quality Control: It's in the Reach of Small Foundries. William J. Sommer. *Steel,* v. 131, Nov. 17, 1952, p. 86-88.

Basic elements needed to start an effective control program. (S12, E general)

545-S. Non-Destructive Tests for Detecting Faults in Metal Parts. G. G. M. Carr-Harris. *Technical Information Service, National Research Council* (Canada), Report 22, Nov. 1951, 11 pages.

Testing techniques. 53 ref. (S13)

546-S. Statistical Evaluation of Rational and Stratified Methods of Sampling. Part III and IV. James V. Strela. *Tool Engineer,* v. 29, Oct. 1952, p. 55-60; Nov. 1952, p. 56-61.

See abstract of parts I and II; item 469-S, 1952. (To be continued.) (S12)

547-S. (French.) **X-Ray Examination of Light Alloys. Study of Some Difficulties in the Interpretation of Radiographs.** Gaston Gauthier and Martial

Renouard. *Revue de Métallurgie,* v. 49, Oct. 1952, p. 720-725; disc., p. 726.

Dangers of misinterpretation. Micrographs and radiographs. Work was confined to various types of Al alloys. (S13, M21, Al)

548-S. (German.) **Gas Sampling Apparatus for the Control of Blast Furnace Operation.** Walter Loorz. *Stahl und Eisen,* v. 72, No. 22, Oct. 23, 1952, p. 1325-1328.

Correlations between burden distribution and gas passage. Description of measuring devices used up to the present includes apparatus for continuous gas sampling and temperature measurement at the top. Method of operation, results, and conclusions. Schematic diagram and temperature curves. (S11, D1, Fe)

549-S. (German.) **Measuring the Temperature of Liquid Steel in the Basic Converter by Means of the Immersion Thermocouple.** Karl Georg and Otto Därmann. *Stahl und Eisen,* v. 72, Oct. 23, 1952, p. 1336-1346.

Compares steel temperatures in the converter when blowing period is nearly completed with observations made in the casting pit. Relationship between temperature and nitrogen content. Tables, graphs, and diagrams. 21 ref. (S16, D3, ST)

550-S. (German.) **Optical Temperature Measurements and Contribution to the Radiation Analysis of Cast Iron.** Kurt Orths. *Stahl und Eisen,* v. 72, Oct. 23, 1952, p. 1349-1353.

Temperatures were measured by means of colorimetric type "Bioptix". It was possible to predetermine quality by means of temperature measurements, radiation analysis, and reflection data of foundry pig-iron melts. Micrographs and graphs. (S16, CI)

551-S. Ultrasonic Flaw-Detector; Details of Recent Developments in the Echo Method of Flaw-Detection. *Aircraft Production,* v. 14, Apr. 1952, p. 126-129.

(S13)

552-S. X-Ray Perfect. David Goodman. *American Machinist,* v. 96, Apr. 14, 1952, p. 155-157.

Use of commercial X-ray laboratories by small industries for inspection of products. Typical radiographs. (S13)

SECTION T

APPLICATIONS of METALS in EQUIPMENT and INDUSTRY

1-T. What Are the Cost Factors in Electric vs. Gas Furnace Operations? A. D. Spillman. *Electrical World,* v. 136, Nov. 19, 1951, p. 108-111.

As applied to various metallurgical and nonmetallurgical operations. (T5)

2-T. Modern Trends in Lithography. *Graphic Arts Monthly and the Printing Industry,* v. 23, Nov. 1951, p. 65, 68, 70, 72, 74, 76, 78.

Use of Monel metal and stainless steel for lithographic plates. (T9, SS, Ni)

3-T. Developments in the Use of Stainless Steel. John L. Cotsworth. *Iron and Steel Engineer,* v. 28, Nov. 1951, p. 66-68.

Emphasizes steel-plant applications. (T5, SS)

4-T. The Progress and Future of Structural Aluminium. C. Marsh. *Light Metals,* v. 14, Oct. 1951, p. 562-563. (T26, Al)

5-T. Light Alloy Fire Tender. *Light Metals,* v. 14, Oct. 1951, p. 566-567.

Small Al-alloy fire engine for use in rural districts. (T21, Al)

6-T. Minor Uses of the Light Metals. VI. Aluminium in Metallurgical Control. *Light Metals,* v. 14, Oct. 1951, p. 579-583.

Applications, mainly in steel and iron deoxidation, nitrogen stabilization, etc. Uses as an alloying element to improve various properties. (T general, B22, Al, ST)

7-T. Magnesium in Radar Plotting Equipment. *Magazine of Magnesium,* Nov. 1951, p. 1-6. (T1, Mg)

8-T. Microphones Made Good Use of Die Castings. L. R. Burroughs. *Materials & Methods,* v. 34, Nov. 1951, p. 69-70.

Varied applications of Zn-alloy die castings in microphones. (T1, Zn)

9-T. Manufacturers Designations for Electronic Cores Produced From Metal Powders. *Materials & Methods,* v. 34, Nov. 1951, p. 103.

Correlates basic material designations with manufacturers' names. (T1, H general)

10-T. Irrigation With Aluminum Pipe. A. T. Race, Jr. *Modern Metals,* v. 7, Nov. 1951, p. 30-32.

New technique. Use of Al pipe makes it much easier to move the system from place to place. (T3, Al)

11-T. Higher; Faster; Farther! *Modern Metals,* v. 7, Nov. 1951, p. 35-36.

Various applications of Mg in the Douglas Skyrocket and Consolidated-Vultee's B-36 bomber. (T24, Mg)

12-T. Packaging With Aluminum Foil. *Modern Metals,* v. 7, Nov. 1951, p. 41-44, 47-48, 50.

An illustrated survey of applications. (T10, Al)

13-T. How to Get Good Sleeve Bearing Life. *SAE Journal,* v. 59, Nov. 1951, p. 40-44. (Excerpts from "Sleeve Bearing—Design, Manufacture & Installation," by Richard J. Schager).

Application of various metals in bearings in internal-combustion engines. (T7, SG-c)

14-T. Adhesive Metal Nameplates Give Permanent Identification, *Steel,* v. 129, Nov. 19, 1951, p. 104.

Millions of paper-thin Al appliques now are being produced for use on hundreds of objects ranging from golf clubs to refrigerators in addition to airplanes. The product, tradenamed Metal-Cal, was developed by Boeing Airplane Co. First, a color-retentive coating is created on the surface of the foil by chemical reaction. Printing is then applied by a standard Multilith offset process. The processing can be made to reproduce any color. (T9, L14, Al)

15-T. A Steel Shortage Overcome. *Chemical Engineering,* v. 58, Nov. 1951, p. 177.

Use of "ELC" (extra-low-carbon) stainless steels developed by Armco as substitute for stabilized stainless steels. They are particularly valu-

able as weldments for duct work, smoke stacks, piping, pulp digesters, processing vessels, acid tanks, and air-conditioning equipment. Mechanical properties and weldability. (T29, T27, Q general, K9, SS)

16-T. Vast Expansion in Aluminum Output Carries Potential Impact on Building. *Engineering News-Record,* v. 147, Nov. 22, 1951, p. 28-29.

Prospects of more extensive application of Al in construction work because of greater availability in the future. (T26, Al)

17-T. Cast Production Molds. John Starr. *Tool Engineer,* v. 27, Dec. 1951, p. 40-43.

Techniques involved in production of patterns, molds, and alloys for metal and nonmetal forming and casting. (T5, E11, CI)

18-T. Stronger Threads in Aluminum Castings. James J. Oussani. *Electrical Manufacturing,* v. 48, Dec. 1951, p. 274.

Use of stainless steel Heli-Coil thread inserts, in the automatic Staplex machine, to prevent stripping of 6-32 threads in the aluminum frame. (T7, SS, Al)

19-T. Lithium Minerals Provide Unique Industrial Raw Material. P. E. Landolt. *Mining Engineering,* v. 3, Dec. 1951, p. 1045-1048.

Applications of Li and Li compounds in various industries. (T general, Li)

20-T. TV Picture Tubes With Iron Envelopes. C. S. Szegho and R. G. Pohl. *Tele-Vision Engineering,* v. 2, Nov. 1951, p. 8-9, 26-27.

Manufacturing techniques developed for the fabrication of tubes which feature envelopes with chromium-iron sealing beads and all-iron cones. The cone is first glazed with vitreous enamel and then joined to the metal by an arc welding process. (T1, L27, K1, Cr, Fe)

21-T. Carbides. 1951 Developments for 1952 Applications. *Magazine of Tooling and Production,* v. 17, Dec. 1951, p. 60, 62.

Successful experimental use of cemented tungsten carbide bearings under high speed, high load, and temperature conditions where conventional bearings fail; and the possibility of being able to hard surface metal parts with a relatively thin "skin" of ultra-hard, wear resisting tungsten carbide. In the latter process, tungsten carbide is flowed onto metal surfaces using conventional shielded arc equipment. (T7, L24, C-n)

22-T. Aviation Metallurgy Inside the U.S.S.R. Henry Brutcher. *Aero-Digest,* v. 63, Dec. 1951, p. 48, 50, 52.

An indirect review of alloys now being used in Russia for aircraft construction. (T24)

23-T. Noble Metals in Chemical Apparatus; Some Recent German Constructional Materials. *Chemical Age,* v. 65, Nov. 10, 1951, p. 627-628.

Reviews recent developments. (T29, EG-c)

24-T. Metals for Gas Turbines (Land and Marine). J. M. Robertson. *Journal of the Birmingham Metallurgical Society,* v. 31, Sept. 1951, p. 122-148.

Surveys the above, including properties, fabrication processes, etc. Includes table of materials available and parts in which they are at present being used or considered for use in construction of gas turbines. See abstract from Iron & Steel Inst. "Symposium on High Temperature Steels & Alloys for Gas Turbines," item 359-T, 1951. (T25, SG-h)

25-T. Handicraft in Aluminium. A. E. Rushbrook. *Light Metals,* v. 14, Sept. 1951, p. 529-534; Oct. 1951, p. 584-589; Nov. 1951, p. 622-630.

Methods for combining the unique properties of light metal in pursuit of hobby craftsmanship. (T9, Al)

26-T. Interim Report of Service Trials of Steel Coal Wagons (1939-1950). J. C. Hudson. *Journal of the Iron and Steel Institute,* v. 169, Nov. 1951, p. 250-256.

Report on four types of steel plate used in construction of railroad hopper cars: ordinary mild steel, low-Cu steel, Cu-Mn steel, and Cu-Cr steel. Corrosion data and results of metallurgical examination are tabulated. (T23, S21, R3, CN, AY)

27-T. The Application of Sintered Metal for Clutch Facing. *Machinery* (London), v. 79, no. 2035, Nov. 15, 1951, p. 855-858.

Characteristics and advantages. (T7)

28-T. Metallurgical Considerations in the Use of Aluminium for Cable Sheathing. I. and II. A. Latin. *Metallurgia,* v. 44, Oct. 1951, p. 167-173; Nov. 1951, p. 231-238.

Part I: Availability of materials, production methods, alloy properties, and sheathing methods (extrusion, die sinking, forming, and welding), and special methods. Part II: Properties of drawn and extruded tube, corrosion protection, and joining. (T1, F26, Al)

29-T. Design of Apparatus and Choice of Materials for Refineries. (In French.) *Revue Universelle des Mines, de la Métallurgie des Travaux publics, des Sciences et des Arts appliques a l'Industrie,* ser. 9, v. 94, Oct. 1951, p. 327-336.

Design of columns, heat exchangers, coolers, storage tanks, and piping. Influence of welding problems, service failures, corrosion, etc. on choice of materials. (T29)

30-T. Lithium-Antimony Photo-Electric Cathodes. (In French.) N. Schaetti and W. Baumgartner. *Vide,* v. 6, July-Sept. 1951, p. 1041-1045.

Their weaker thermal emission seems to make them more adaptable to studies in the violet and ultraviolet regions of the spectrum than are Cs-Sb cathodes. (T1, P, Li, Sb)

31-T. Use of Light Metals in the Construction of C.F.T.H. Radar Apparatus. (In French.) G. Frigot and G. Turré. *Revue de l'Aluminium,* v. 28, Sept. 1951, p. 329-334.

Materials for radar apparatus for spotting and landing and radars for planes, manufactured by Compagnie Francaise Thomson-Huston. (T1, Al, Mg)

32-T. Aluminum Radiators. (In French.) Marcel Grimal. *Revue de l'Aluminium,* v. 28, Sept. 1951, p. 341-344.

Theoretical, technical, and economic aspects. Includes description of radiators being manufactured by Radial Corp., plus sketch and photograph. (T27, Al)

33-T. The Very Remarkable Performance of Aluminum-Steel Trolley Wires. (In French.) Louis Albert. *Revue de l'Aluminium,* v. 28, Oct. 1951, p. 362-364.

Detailed inspection of wires owned by a Paris transit company showed, after 510,000 trolley passages, that 2,000,000 can be made before the wire wears out, or four times as many as possible with electrolytic Cu wire. (T1, Q9, Cu, Al)

34-T. Dr. Lescoeur's Results in Treatment of Wounds by Application of Aluminum. (In French.) Jean Lescoeur. *Revue de l'Aluminium,* v. 28, Oct. 1951, p. 370-371.

Results obtained in about 50 cases of wounds treated by the application of Al. Al foil gummed on glass wool, and also thin sheets of annealed Al, have been used successfully. (T10, Al)

35-T. Aluminum Panels of the New Building of the National Building Federation. (In French.) Maurice Victor, Jean Blanchot, and Lucien Alff. *Revue de l'Aluminium,* v. 28, Oct. 1951, p. 375-388.

(T26, Al)

36-T. High-Vacuum Photoelectric Cells and Secondary Electron Amplifiers. (In German.) N. Schaetti and W. Baumgartner. *Chimia,* v. 5, Oct. 15, 1951, p. 228-236.

Modern high-vacuum photo-electric cells, and uses in chemical research. Amplification of photo-electric currents, and suitability of various alloys as cathode materials. 19 ref. (T1)

37-T. Heat Resistant Steels and Alloys for Gas Turbines; Their Development and Investigation in England. (In German.) Erich Franke. *Werkstoffe und Korrosion,* v. 2, Oct. 1951, p. 378-386.

A survey. 40 ref. (T25, AY, SS, SG-g, h)

38-T. Alloy Steels for Use in Manufacture of Sheet and Formed Glass Products. (In German.) August Dammer. *Werkstoffe und Korrosion,* v. 2, Nov. 1951, p. 409-414.

Steels used for rolls for sheet-glass production, and for molds used in blowing glass containers, dishes, etc. Influence of basic alloys and of structure and proposals for savings in Ni. (T29, AY)

39-T. Designing Dies for Postforming Thermosetting Laminates. William I. Beach. *Machinery* (American), v. 58, Dec. 1951, p. 171-177.

Design and construction of the dies. Application of wood, Masonite, phenolic resins, Kirksite, Al, brass, and cast iron as die material. (T5, Al, Cu, CI)

40-T. 14 Lobes Make a Big Sphere. *Chemical Engineering,* v. 58, Dec. 1951, p. 220.

Sphere is made of steel plates welded together and is used to store liquid methyl chloride at 150 psi. (T29, ST)

41-T. Ore Bridge Employs Manganese Steel. *Edgar Allen News,* v. 30, Dec. 1951, p. 5-6.

(T26. AY)

42-T. Aluminum Foil Structural Core. T. P. Pajak. *Light Metal Age,* v. 9, Dec. 1951, p. 8-9, 37.

Uses, fabrication practices, and strength characteristics of structural sandwich material developed for aircraft. (T26, T24, Al)

43-T. Titanium in Aircraft Production. William S. Cockrell. *Light Metal Age,* v. 9, Dec. 1951, p. 10-12.

Results of an investigation of behavior of Ti in welding, forming, and heat treatment. High-temperature deterioration. (T24, K general, G general, J general, Ti)

44-T. Durability of Aluminium and Its Alloys—the Chemical Industries. *Light Metals,* v. 14, Oct. 1951, p. 541-546; Nov. 1951, p. 639-643; Dec. 1951, p. 662-667.

Last three parts of 5th and last article in a series dealing with the durability of Al in various spheres

of application. Second part: Uses of Al in the textile industry. Last part: Various applications. (T29, Al)

45-T. Domed Roof at Norton Road School. *Light Metals,* v. 14, Dec. 1951, p. 657-658.

Use of pure Al in a roof. (T26, Al)

46-T. The Progress and Future of Structural Aluminium. C. Marsh. *Light Metals,* v. 14, Dec. 1951, p. 670-672.

A survey with the aim of freeing structural Al from steel concepts. (T26, Al)

47-T. Rolled Aluminum Bushings Low in Cost, High in Strength. *Materials & Methods,* v. 34, Dec. 1951, p. 174, 176.

Production steps, applications and features of aluminum bushings used in precision grinding wheels. (T7, G4, Al)

48-T. Forum on Technical Progress: Materials & Compounds. *Steel,* v. 130, Jan. 7, 1952, p. 241-242, 244, 246, 248, 251-252, 254, 257-258, 260, 262, 265, 268, 270, 272, 275, 278, 280, 282, 285.

Brief discussions by men from industry on the present situation and anticipations for 1952 regarding metal shortage, substitutes, and replacements. (T general)

49-T. The Use of Preferred Orientation Strip Steel in Turbine-Generator Stators. J. W. Apperson and C. B. Fontaine. *Transactions of the American Institute of Electrical Engineers,* v. 70, pt. 1, 1951, p. 836-839; disc., p. 839-840.

Specific application of oriented strip steel to turbine generators in the range of 1000-20,000 kw. Advantages of the oriented strip material over the former nonoriented materials. Test results on 16 generators using oriented strip. The material itself and a brief history of its development. (T25, P15, ST)

50-T. A New Proposal for Steel Filler Wire for Welding. H. Sekiguchi. *Welding Journal,* v. 30, Dec. 1951, p. 622s-624s.

Results of tests using steel wire containing adequate quantities of deoxidizers, such as Mn and Si, for filler wires for welding of mild steel. Data are graphed and tabulated. (T5, K1, K2, CN)

51-T. The Communications Wire Program of the Signal Corps. Howard F. Cleary. *Wire and Wire Products,* v. 26, Dec. 1951, p. 1141-1142, 1180.

Methods of procurement of communications wire and cable by the Signal Corps; the general existing requirements of the main classes of wire and cable; prospects of requirements in the immediate future of primary items. Research and development work. (T1, A4)

52-T. Steels for Woodworking Tools. J. Lomas. *Machinery Lloyd* (Overseas Ed.), v. 23, Dec. 8, 1951, p. 68-69, 71, 73, 75.

Various types of toolsteels for specific applications. Methods of heat treatment for attaining necessary properties. (T6, J general, TS)

53-T. Steels for Specialized Applications. J. M. Mowat. *West of Scotland Iron and Steel Institute Journal,* v. 57, 1949-50, p. 167-187; disc., p. 187-192.

Steels with distinctive properties. Chemical composition, methods of forging, heat treatment, and origin influence service efficiency. The latest developments in turbine rotors for high-temperature service where resistance to creep is of the utmost importance. Manufacture of forged steel rolls. (T25, T5, F22, Q general, AY)

54-T. Presidential Address. W. Barr. *West of Scotland Iron and Steel Institute Journal,* v. 57, 1949-50, p. 1-20.

Surveys results of metallurgical research for the development of new and better products. Structural mild steel, high-tensile structural steel, steels for high-temperature service, and stainless-clad steels. Failures, causes, and mechanical testing. (T general, Q general, SS, CN)

55-T. Three Laboratory Furnaces for High Temperatures. (In French.) R. L. Bickerdike. *Métaux: Corrosion—Industries,* v. 26, Oct. 1951, p. 415-421.

Arc, tungsten-resistance, and high-frequency induction furnaces designed for research on materials at high temperatures. Illustrations and diagrams. 24 ref. (T5)

56-T. Aluminum in Telecommunications Industry. (In French and German.) E. Glaus. *Aluminum Suisse,* Nov. 1951, p. 197-205. (T1, Al)

57-T. Diamond Substitutes. (In Russian.) M. E. Galkin and A. I. Gopp. *Stanki i Instrument,* v. 22, Mar. 1951, p. 16-18.

Metallic, abrasive, and hard-alloy substitutes for industrial diamonds. (T6, SG-j)

58-T. "Let's Decide To Like Aluminum". C. E. Bathe and Bryce Brady. *Electrical World,* v. 137, Jan. 14, 1952, p. 85-88.

Application of Al as a conductor material for urban distribution systems. Problems and how they were solved. (T1, Al)

59-T. Four-Wing Tipped Shanks Lower Flin Flon Drilling Costs. T. A. O'Hara. *Engineering and Mining Jour-*

nal, v. 153, Jan. 1952, p. 88-90.
Compares carbide-tipped shanks with threaded carbide bits and threaded shanks, on the basis of cost, drilling speed, and wear resistance. In view of performance tests, carbide-tipped shanks are being adopted for mine drilling. (T28, Q9, C-n)

60-T. Future of Minerals in Structural Products. John D. Sullivan. *Engineering Experiment Station News.* (Ohio State University), v. 23, Oct. 1951, p. 3-4, 27-29.
Ceramics and Al and Mg Alloys, Ti, and other structural materials, their role in national economy, application in jet planes, resistance to corrosion, the critical supply situation, and its alleviation through synthetics and ingenuity. (T26)

61-T. The Development of Air Expansion Turbines. E. Crewdson and P. E. F. Crewdson. *Industrial Chemist and Chemical Manufacturer,* v. 27, Dec. 1951, p. 551-553.
Results of experiments made with two types of air expansion turbines, inward flow reaction, and outward flow impulse. Comparative data. Materials of construction. Duralumin, bronze, and 18-8 stainless steel are all suitable. (T25, Al, Cu, SS)

62-T. (Book) **Industrial Furnaces.** v. 1. Ed. 4. W. Trinks. 526 pages. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $10.00.
General arrangement of subject matter has been retained with the exception that infrequently used material has been removed to the appendix. About 40% of the text has been rewritten and 94 new illustrations added. Calculations and tabular data have been brought up to date. Much new material has been added. Chapter headings are: Heating capacity; fuel economy; heat saving appliances; strength and durability, movement of gases; and appendices. (T5)

63-T. Successful Foil-Kraft Drum. *Modern Packaging,* v. 25, Jan. 1952, p. 105-107.
Containers for oil and grease. The top and bottom are of sheet steel; the sides are formed of multiple plies of Al foil laminated to Kraft linerboard. (T29, Al, ST)

64-T. Offset Aluminum "Decals". Ray Bloomberg. *Modern Lithography,* v. 20. Jan. 1952, p. 51, 53.
Decals are made of aluminum stock 0.003-in. thick, on which are imprinted type or designs, with a cellophane-covered cement backing for easy application. The process consists of creating a color-retentive coating on the surface of the foil by chemical means, then applying the printing by a standard Multilith offset process, in any color. (T26, Al)

65-T. New Ordnance Materials. Benjamin S. Mesick. *Ordnance,* v. 36, Jan.-Feb. 1952, p. 573-576.
The lighter, stronger metals and plastics which will increase our airborne firepower. New welding electrodes for armor plate, ductile cast iron, Al, Mg, Ti, rubber, plastics, and adhesives. Unsolved problems. (T2)

66-T. Special Steels in Navy Blue. *Steel Horizons,* v. 14, Winter 1951-1952, p. 22-23.
Picture story of applications of stainless and other corrosion and heat resistant steels in the U. S. Navy. (T22, SS, SG-g, h)

67-T. Lead Shot for Gamma-Ray Shielding. *Nucleonics,* v. 10, Jan. 1952, p. 27. (From report of A. Nightingale, *British Journal of Radiology,* v. 24, 1951, p. 568.)
Cavity walls made of sheet iron and filled with 0.1-in. lead shot may be used to replace solid lead walls used to protect personnel against gamma radiation. The lead-shot walls are not suitable for shielding photographic materials. (T8, Pb)

68-T. Use of Materials; Problems of Application in Advanced Aircraft. H. H. Gardner. *Aircraft Production,* v. 14, Jan. 1952, p. 16-18.
Some materials and the characteristics that warrant their application to specific structural problems. Includes Al-Zn-Mg alloys, carbon steels, ferritic steels, and Ti. (T24, Al, CN, AY, Ti)

69-T. Sleeve Bearings—Design, Manufacture and Installation. Richard J. Schager. *SAE Quarterly Transactions,* v. 6, Jan. 1952, p. 165-174.
Materials, design features, installation, and manufacture of sleeve bearings. Includes micrographs, macrographs, diagrams, and graphs. Emphasis is on pertinent mechanical properties and corrosion resistance of the various bearing metals and alloys. (T7, Q general, R general, SG-c)

70-T. Trends in Industrial Piping. Will H. Shearon, Jr. *Chemical and Engineering News,* v. 30, Jan. 28, 1952, p. 316-321.
As applied to the chemical industry. Metals, plastics, glass, ceramics, and their combinations—including coatings and linings. Data on mechanical and physical properties, sizes available, etc., are tabulated. (T29)

71-T. Testing of Various Materials for Connecting-Rod Bearings, With

Particular Emphasis on Conditions in the Ford-V8 Motor. (In German.) K. Longard. *Metall*, v. 5, Nov. 1951, p. 480-485; Dec. 1951, p. 539-544.

Investigations were made to develop a testing method for bearing materials in aircraft motors which would duplicate actual working conditions. Of the great number of contributing factors, three were chosen for closer scrutiny: the bearings, the lubricant, and the shaft system. Mechanical and physical test results for various ferrous and nonferrous alloys. 17 ref.
(T7, Q general, SG-c)

72-T. Studies on the Shape and Material of Coal Cutter Bits. II. (In Japanese.) Han. Watanabe. *Journal of Mechanical Laboratory*, v. 5, July 1951, p. 85-88.

Use of carbon steel, Stellite, white cast iron, and toolsteel bits. Tables and graphs.
(T28, CN, CI, TS, SG-m)

73-T. Metal Honeycomb Replaces Ribs, Stringers. *Aviation Week*, v. 56, Jan. 28, 1952, p. 41, 44.

In Northrop high-speed airplanes aluminum (3S-H) honeycomb core material is being substituted for the conventional rib and stringer make-up of control surfaces. It combines high strength-weight and stiffness-weight characteristics. (T24, Al)

74-T. Lead in Modern Chemical Construction. Kempton H. Roll. *Chemical Engineering*, v. 59, Jan. 1952, p. 281-282, 284-286, 288-290.

Latest techniques and improvements. Methods of supporting sheet lead, new methods of testing lead linings and welds, lead bonded to steel, lead-covered Cu or steel heating coils, and use of acidproof brick with an impervious lead interliner.
(T29, Pb)

75-T. Hardened Gray Iron—an Ideal Material for Diesel Engine Cylinder Sleeves and Liners. Garnet P. Phillips. *Foundry*, v. 80, Jan. 1952, p. 88-95, 222, 224, 226, 228; Feb. 1952, p. 106-111.

Studies to determine the most desirable type of wear resistant iron for use in cast cylinder sleeves and liners of diesel engines. Results of wear tests on various iron alloys and special steels. Includes physical properties, corrosion tests, and microstructures. Second part: Molding and melting practices. Illustrations, graphs, and tables.
(T25, Q9, R11, E11, CI)

76-T. Production Use of Tungsten Carbide Reamers. *Machine and Tool Blue Book*, v. 48, Feb. 1952, p. 187, 190, 192, 194.

Use of W carbides in increasing life of reamers for both steel and nonferrous materials.
(T6, G17, W, C-n)

77-T. Aluminum Alloy Die Castings Used in Complex Automotive Parts. T. C. Du Mond. *Materials & Methods*, v. 35, Jan. 1952, p. 80-81.

Advantages in using Al. (T21, Al)

78-T. Steel for Machinery; Yesterday, Today and Tomorrow. Muir L. Frey. *Metal Progress*, v. 61, Jan. 1952, p. 55-58.

Past progress and trends in constructional steels, hardenability, high-temperature alloys, design, and research. (T26, T general, ST)

79-T. Light Metal Castings for Aircraft Structures. Keith F. Finlay. *Metal Progress*, v. 61, Jan. 1952, p. 81-83.

Future trends. Criticisms of existing practices. Emphasis is on Al and Mg, with brief mention of Ti.
(T24, Al, Mg, Ti)

80-T. Production and Properties of Discs for Aircraft Gas-Turbine Engines. H. W. Kirkby. *Metal Treatment and Drop Forging*, v. 19, Jan. 1952, p. 3-11.

The types of steel and other high-temperature alloys now available for gas turbine discs. Mechanical properties and scaling resistance. Data are graphed and tabulated. 11 ref.
(T25, Q general, SS, AY, SG-h)

81-T. Drilling With Coromant Equipment. J. Fred Johnson. *Mining Engineering*, v. 4, Jan. 1952, p. 37-41.

Coromant is the trade name of an alloy steel drill rod tipped with a chisel-type WC bit. Evaluates this equipment, giving detailed information on history of development, advantages and disadvantages, comparative performance of steel and WC bits, and footage drilled per bit in various types of rock.
(T28, AY, C-n)

82-T. The Selection and Use of Drill Steel. Charles M. Cooley. *Mining Engineering*, v. 4, Jan. 1952, p. 43-46.

Types of drill steel available, life of drill rod and its determination, stresses in drill rod that cause typical failures encountered, and heat treatments and surface treatments for improving service life.
(T28, Ts)

83-T. The Selection of Rock Drill Bits. Lamar Weaver. *Mining Engineering*, v. 4, Jan. 1952, p. 46-48.

Results of preliminary bit tests comparing detachable steel and tungsten-carbide bits. (T28, ST, C-n)

84-T. Aluminum in General Line Containers. *Modern Metals*, v. 7, Jan. 1952, p. 24-28, 30.

Miscellaneous packaging containers developed in England and Europe. Typical examples of shallow drawn, deep drawn, impact extruded, and built-up containers; lids and covers of all types; methods of man-

ufacture; finishing and decoration. (T10, G general, L general, Al)

85-T. Why Magnesium in Aircraft Construction? R. Smallman-Tew. *Modern Metals,* v. 7, Jan. 1952, p. 33-35.

Pros and cons of Mg in aircraft. Some replacement examples in Roe's Jetliner, the first jet-powered commercial plane. (T24, Mg)

86-T. B-36 Experience With Magnesium. D. A. Tooley. *Modern Metals,* v. 7, Jan. 1952, p. 49-50, 52-54.

Strategic Air Command's B-36 intercontinental bomber contains more Mg than any other production-model airplane. What the magnesium industry should do to stimulate use of their metal by aircraft companies. Fatigue properties, corrosion preventive coatings, new alloys, and standard sizes available in various shapes. (T24, Mg)

87-T. Electrical Sheet Steel. P. Butler. *Proceedings of the Institution of Electrical Engineers,* v. 99, Pt. 1, Jan. 1952, p. 30-31. (A condensation.)

Differences in hot rolled and cold rolled core materials. (T1, F23, ST)

88-T. Aluminum: Heavy Expansion in a Light Metal. Vance Bell. *Steel,* v. 130, Feb. 4, 1952, p. 69-71.

Surveys possible new markets for Al for the day when there is no military outlet. (T general, A4, Al)

89-T. High Lead Copper-Lead Bearings Developed for Slow Speed Diesels. Albert Willi, Jr. *Steel,* v. 130, Feb. 4, 1952, p. 94, 96, 114.

Application of Cu-Pb bearings to unhardened crankshafts. Improved casting technique, fatigue and corrosion resistance.
(T7, Cu, Pb, ST, SG-c)

90-T. A Laboratory for the Production of Zirconium Ignition Pastes for Photographic Flashlamps. William C. Fink. *Sylvania Technologist,* v. 5, Jan. 1952, p. 7-9.

The properties and applications of Zr and the hazards involved in handling Zr powder. Design of a laboratory for work involving this material. 18 ref.
(T1, P general, H11, Zr)

91-T. Simplified Approach to Toroidal Inductor Design. Part 2. H. E. Harris. *Tele-Tech,* v. 11, Feb. 1952, p. 52-53, 70, 73-74, 78, 80, 82.

Design procedures to provide a rapid determination of the applicability of a new core material. The use of Mo permalloy for cores.
(T1, SG-n)

92-T. The Selection of Aluminium Alloys for Shipbuilding. (In English.) D. W. Taylor and W. Muckle. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 17, Dec. 1951, p. 365-379.

Part 1: Choice of the preferred alloys in relation to economic production in the rolling mill of the required sizes of plate and sections and to influence of chemical composition on rolling and mechanical properties. Examples of manipulation of material in the shipyard, and methods of joining. Weathering characteristics of the alloys. Part II: The different parts of a ship in which Al alloys can be used. Choice of material in relation to strength requirements and some examples of the weight saving which can be achieved. The influence of weight saving on design. (T22, Al)

93-T. Use of Light-Alloy Bolts for Mechanical Joining of Aluminum Conductors. (In French.) Auguste Dalmasso. *Revue de l'Aluminium,* v. 28, Nov. 1951, p. 393-395.

These bolts make it possible to keep the contact pressure constant whatever may be the variations of temperature. This avoids risk of creep in case of overheating, or of defective contact in case of a fall in temperature, both risks existing with steel bolts. (T1, K13, Al)

94-T. Gas Turbines. (In French.) Maurice Victor. *Revue de l'Aluminium,* v. 28, Nov. 1951, p. 409-426.

Textual and pictorial summary of gas turbines made for various countries. Emphasis is on applications of light alloys. (T25, Al, Mg)

95-T. Aluminum Alloys for Corrosion-Resistant Storage Tanks. E. C. Hartmann and Fred L. Plummer. *Civil Engineering,* v. 22, Feb. 1952, p. 25-27.

Tabular data show Al alloys most frequently used in storage tanks, mechanical properties, and recommended minimum shell-plate thicknesses.
(T26, R general, Q general, Al)

96-T. How Dominion Coal Is Boosting Haulage Efficiency With Aluminum Cars and Diesels. *Coal Age,* v. 57, Feb. 1952, p. 94-97.

Advantages derived from the use of Al mine equipment by Dominion Coal Co. Ltd., Sydney, N. S.
(T28, Al)

97-T. Printing From Magnesium Cylinders. C. H. Vivian. *Compressed Air Magazine,* v. 57, Feb. 1952, p. 42-46.

An engraved Mg printing cylinder trade-named Magnasleeve.
(T29, Mg)

98-T. The "How To" of Aluminum in Distribution. C. E. Topping. *Electrical World,* v. 137, Feb. 11, 1952, p. 97-100.

Use of Al in power-distribution systems. (T1, Al)

99-T. Aluminum Era Hastened By Defense Needs. C. W. Leihy. *Electric Light and Power,* v. 30, Feb. 1952, p. 88-91.

Availability of Cu and Al, and Al prospects for electrical and mechanical applications in view of the "forced conversion" program of government control. (T1, A4, Al, Cu)

100-T. The Swing Toward Aluminum. Howard P. Seelye. *Electric Light and Power,* v. 30, Feb. 1952, p. 92, 136.

Shortage of Cu and possibilities in Al substitution in electrical construction. (T1, A4, Al, Cu)

101-T. AG&E Specifies Aluminum for Urban Overhead. H. A. Enos, R. J. Bentzel, and C. H. Wagner, Jr. *Electric Light and Power,* v. 30, Feb. 1952, p. 93-100.

Economic considerations led American Gas & Electric Service Corp. to use Al long before Cu shortages started. Some of their practices developed through increasing use since 1949. (T1, Al, Cu)

102-T. Detroit Edison's Aluminum Substitution Program. E. C. De Baene. *Electric Light and Power,* v. 30, Feb. 1952, p. 101-105.

Applications for Al and comparative physical and mechanical properties of Al and Cu.
(T1, P general, Q general, Al)

103-T. Aluminum for Underground Network Cables. C. P. Xenis. *Electric Light and Power,* v. 30, Feb. 1952, p. 106-109.

Difficulties and methods of solving problems encountered in splicing Al underground cables. Step-by-step method of constructing soldered joints. Brazed and riveted connections. Tensile test data.
(T1, K7, K8, K13, Al, Cu)

104-T. ACSR in Overhead Distribution. R. W. Westphal and C. E. Topping. *Electric Light and Power,* v. 30, Feb. 1952, p. 110-117.

Construction details and problems involved in using steel-reinforced Al conductors to replace Cu for power-distribution systems. Sketches show construction standards, pole and house connections, and clamps designed for bimetallic connections.
(T1, Al, Cu, ST)

105-T. Aluminum Needs Good Connections. Julian Rogoff and Irving Matthysse. *Electric Light and Power,* v. 30, Feb. 1952, p. 118-122.

A test program was conducted in an effort to overcome the following characteristics of Al antagonistic to good electrical joints: oxide coatings, poor electrical conductivity, electrolytic corrosion, and softness which causes excessive creep.
(T1, P15, R1, Q3, Al, Cu)

106-T. Aluminum Conductor—What the Suppliers Say About It. Cornelius F. Kelley. *Electric Light and Power,* v. 30, Feb. 1952, p. 124, 129-130.

Suppliers of conductors were asked where they could substitute Al for Cu. Comments and discussions are given. (T1, Al, Cu)

107-T. Aluminum Substation Structures Offer Attractive Possibilities. *Electric Light and Power,* v. 30, Feb. 1952, p. 131.

Advantages of Al over steel for this application. Reduced maintenance, greater safety, and saving in erection time and costs.
(T26, Al)

108-T. The Application of Mechanically Held Carbide Tools. *Magazine of Tooling and Production,* v. 17, Feb. 1952, p. 70-73.

The Mechaniclampt carbide tool fabricated from a heat-treated alloy steel body and standard rectangular inserts, by Firth-Sterling Steel & Carbide Corp., Pittsburgh. Design of the holder is such that maximum strength and durability are incorporated. Tabulated data give comparative information on brazed, Mechanigript, and Mechaniclampt tools. (T6, G17, AY, C-n)

109-T. Trends in Carbide Tooling. Bennett Burgoon, Jr. *Magazine of Tooling and Production,* v. 17, Feb. 1952, p. 74, 114, 118.

Significant developments in the application of the carbide tool, and the tool itself. (T6, C-n)

110-T. Using Tungsten Carbide for Wear Resistance. *Magazine of Tooling and Production,* v. 17, Feb. 1952, p. 82, 108.

Uses for wear-proofing of welding and other fabrication equipment.
(T5, Q9, SG-m, W, C-n)

111-T. Boron Treated Types of Alternate Steels. *Materials & Methods,* v. 35, Feb. 1952, p. 127, 129.

Tables indicating some of the applications in which boron steels have substituted successfully for more common standard steels.
(T general, AY)

112-T. A Successful Experiment With Broaches. W. Jubb. *Metallurgia,* v. 45, Jan. 1952, p. 11.

A carbon case hardened steel and a Ni-Cr case hardened steel were used to make a set of broaches. Performance of these materials.
(T6, G17, CN, AY, TS)

113-T. High Lead Copper-Lead Bearings for Slow Speed Diesel Engines. Albert Willi, Jr. *Diesel Power and Diesel Transportation,* Feb. 1952, p. 54-55.

See abstract from *Steel,* item 89-T, 1952. (T7, Cu, Pb, ST, SG-c)

114-T. Germanium Promises an Early Revolution in Electronics. *Engineering and Mining Journal,* v. 153, Feb. 1952, p. 154, 156, 159.

Utilization of electrical properties of Ge. New Ge units are an amplifier

or transistor and a rectifier. Advantages and a general survey of the metal and its properties.
(T1, P15, Ge)

115-T. Metals, Ceramics, and Seals Used In Vacuum Tubes. Stanley Taylor. *Engineering Experiment Station News* (Ohio State University), v. 23, Dec. 1951, p. 52-55.

Presents some processes for metal-ceramic and mica-metal seals.
(T1, K11)

116-T. Aluminum: Where It's Used and Why in Modern Food Handling. Floyd A. Lewis. *Food Engineering,* v. 24, Feb. 1952, p. 77-80, 177-179.

An illustrated survey. (T29, Al)

117-T. Magnesium Is Important in Sikorsky Helicopters. *Magazine of Magnesium,* Feb. 1952, p. 14-15.

Used for the fuselage skin, gear box housing, main wheels, seats for the pilot and co-pilot, and smaller miscellaneous assemblies within the ship. (T24, Mg)

118-T. Fine-Wire Resistors for Measuring and Control Purposes; Technical Principles and Production. (In German.) Otto Schultze. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, Jan. 11, 1952, p. 43-47.

The resistors are very fine wires used in apparatus for control of temperature and other variables, and in other apparatus for various purposes. Surveys the various alloys used, their mechanical properties, corrosion and heat resistance, electrical properties, production by rolling and cold drawing, methods of soldering and insulating the wires, and methods of coil winding. Comparative properties of bare and lacquered wires. Photographs, diagrams, and graphs. (T8, SG-q)

119-T. New Aluminum Art Technique. *Light Metal Age,* Feb. 1952, p. 18-20.

New art technique promises to expand the application of Al in the field of decoration. High-purity Al sheet is first treated with dilute acid to produce a "frosty" finish. From a drawing of the desired mural, an outline is traced on the metal. After masking certain areas, the material is scratched with steel wool or other abrasives. When colored lights are directed at the murals, an illusion of iridescence is produced. The effect can be varied in many ways.
(T9, Al)

120-T. Aluminium in Motor Cycles and Cycles. *Light Metals,* v. 15, Feb. 1952, p. 49-52, 53.

British applications. (T10, Al)

121-T. New Design for Aluminium Roofs. *Light Metals,* v. 15, Feb. 1952, p. 58-59

Diagrams and illustrations.
(T26, Al)

122-T. Applications of Light Metals. *Light Metals,* v. 15, Feb. 1952, p. 63-65.

Third and concluding section of a bibliography on the application of Al and Mg and their light alloys which have appeared in *Light Metals* from June 1949 to Dec. 1951, inclusive. (T general, Al, Mg)

123-T. Swedish All-Aluminium Passenger Ships. Valde Oskarson. *Light Metals,* v. 15, Feb. 1952, p. 69-70.

Advantages of Al ships. (T22, Al)

124-T. Manufacture of Gas Turbine Blades; Their Properties, Forging, Heat Treatment and Inspection. H. W. Kirkby. *Metal Treatment and Drop Forging,* Feb. 1952, p. 61-66.

Alloys suitable for both short-life (airplane engine) and long-life gas turbines. The forging of blades, their heat treatment and testing. Data are graphed and tabulated.
(T25, F22, J general)

125-T. Alloys vs. Straight Carbon Steel for Mechanical Springs. *Mainspring,* v. 14, Feb. 1952, 4 pages.

Conditions necessary to make pretempered wire, and the reasons why some alloy steels do not lend themselves to this process. The patenting process and resulting mechanical properties.
(T7, J25, Q general, AY, CN)

126-T. Free Movement Stressed in Copper Roof Design. *Sheet Metal Worker,* v. 43, Feb. 1952, p. 44-45.

Use of heavy-weight cold rolled Cu and heavy soft Cu in roof construction. (T26, Cu)

127-T. Aluminum Foil. *American Pressman,* v. 62, Feb. 1952, p. 18, 20. (Reprinted from "ABC's of Aluminum," Reynolds Metals Co., 1950.)

Uses of the foil. (T10, Al)

128-T. Wider Uses Found for Textured Metals. *Automotive Industries,* v. 106, Mar. 1, 1952, p. 51.

Applications for ferrous and nonferrous textured metals in automobiles and buses. (T21)

129-T. Stainless Steels in Chemical Handling. *Canadian Chemical Processing,* v. 36, Feb. 1952, p. 64.

Experiences of specific plants.
(T29, R5, SS)

130-T. Better Use of Common Metals. *Chemistry,* v. 25, Feb. 1952, p. 27-29.

Includes a new metal-bonding process in which Pb is bonded to steel; use of Al in the bases of incandescent electric light bulbs.
(T1, K12, Pb, Al)

131-T. Metal-Surface and Other Fluorocarbon Combinations. Merritt A. Rudner. *Electrical Manufacturing,* v.

49, Mar. 1952, p. 106-110, 282, 284, 286, 288.

Manufacturing techniques now permit practically unlimited "custom-built" combinations of fluorocarbon polymers with a wide range of metals and various organic and inorganic materials. Properties of Teflon and similar fluorocarbon polymers. Application of metallic layers or laminates to the resinous material; or use of metallic or ceramic powders as fillers. A variety of unusual applications of the products. (T1, H general)

132-T. Power Plant Piping. Hugh Welshman, Jr. *Heating, Piping & Air Conditioning,* v. 24, Feb. 1952, p. 88-95; Mar. 1952, p. 86-87.

Design, manufacture, fabrication, installation and operation of modern piping systems. Welding and fabricating details. Preheating and stress relieving with respect to welding carbon and alloy steel pipe. Advantages of prefabricating power piping assemblies. (T27, K general, CN, AY)

133-T. Tests Air Panel Heating, Cooling for Floor or Ceiling Use. R. P. Goemann. *Heating, Piping & Air Conditioning,* v. 24, Mar. 1952, p. 98-99.

Two methods of construction for heating or cooling by means of air circulated within either floors or ceilings. Results of a test installation. The basic material used is a cellular steel panel which is widely employed as a structural subfloor. The panels are welded to the steel frame of the building and topped with a 2½-in. poured concrete floor. (T27, ST)

134-T. Wanted: Better Materials for Nuclear Reactors. George E. Evans. *Iron Age,* v. 169, Mar. 13, 1952, p. 93-97.

Reactors resemble huge heat exchangers, and materials must have satisfactory physical and thermal properties. Ti, Zr, and Be offer possibilities as construction materials. Bi, Pb, Na, and K can be used as liquid metal coolants. Ceramics and ceramic-metallics offer unusual mechanical properties at high temperatures. Several new alloys are suggested. (T29, P general, Q general)

135-T. How to Choose Spring Materials. M. Gerard Fangemann. *Materials & Methods,* v. 35, Jan. 1952, p. 85-89.

Types of springs, allowable stress and type of stress, vibrating frequency, and type of material applicable. Tabulated data. (To be continued.) (T7, Q general, SG-b)

136-T. Progress in Aluminium and Its Alloys; Current Applications and Future Prospects. P. L. Martyn. *Metallurgia,* v. 45, Feb. 1952, p. 65-69.

A number of interesting applications and future prospects in the light of the re-armament program and growing production capacity. (T general, Al)

137-T. Use and Manufacture of High Precision Antifriction Bearings. M. Pichaud. *Microtechnic* (English Ed.), v. 5, Nov.-Dec. 1951, p. 368-383; disc., p. 384-386. (Translated from the French.)

The precision bearing, its applications, conditions of use, and manufacture. Diagrams and tabular data. (T7)

138-T. For Kaiser's New Smelter: Aluminum Washers & Coolers. *Modern Metals,* v. 8, Feb. 1952, p. 32.

Parts fabricated from Al. (T5, Al)

139-T. How Aluminum Can Replace Tinplate in Containers. G. W. Birdsall. *Modern Metals,* v. 8, Feb. 1952, p. 47-48, 50-51.

See abstract of "Aluminum Containers Stretch Tin Supply," *Steel;* item 479-T, 1951. (T10, Al)

140-T. Lightweight Engine of Die Cast Aluminum. *Product Engineering,* v. 23, Mar. 1952, p. 144-145.

Engine developed by West Bend Aluminum Co., West Bend, Wis. (T25, E13, Al)

141-T. Marine Developments in Aluminium. *Transactions of the Institution of Engineers & Shipbuilders in Scotland,* v. 95, pt. 2, 1951-1952, p. 49-63.

Extensive discussion by various individuals of paper by J. Venus, published in a previous issue. Includes author's reply. (T22, Al)

142-T. Special Light Steel Construction. (In French.) E. Hünnebeck. *L'Ossature Métallique,* v. 16, Dec. 1951, p. 589-593.

Three factors of importance in steel construction are quality of the steel; deformation resistance of the steel; and ease of assembly of sections by rivets, bolts, or welding. Several types of such structures are illustrated. (T26, K general, ST)

143-T. High Resistance ALS Steel for Light Construction. (In French.) A. Bartocci. *L'Ossature Métallique,* v. 16, Dec. 1951, p. 594-598.

Composition and mechanical properties of new types of low-alloy steels having excellent welding characteristics and a higher strength range—80-110 kg. per sq. mm.—than steels with low-alloy compositions. Tables and photographs. (T26, AY)

144-T. Special Alloys and Electrical Resistance Materials. (In French.) M. Fernier. *Métallurgie et la Construction Mécanique,* v. 83, Nov. 1951, p. 863,

865-867, 869-871.

Special thermal-expansion alloys, thermocouples, special alloys for electrical and magnetic applications, electrical resistors, and thermocouples. Pertinent physical properties are tabulated and charted.
(T1, P11, P15, P16, S16, SG-a, q, r, s)

145-T. Triplex Steel for Plow Moldboards. (In French.) M. Dubois. *Métallurgie et la Construction Mécanique,* v. 83, Nov. 1951, p. 879-880.

Relative merits of ordinary open-hearth steel and triplex steel; advantages of the latter. Various methods of surface finishing (hard Cr plating, carburization, nitriding, and chromizing).
(T3, J28, L general, CN)

146-T. Magnets. (In French.) M. Allec. *Métallurgie et la Construction Mécanique,* v. 83, Nov. 1951, p. 881, 883, 885-887.

Various types of magnets, their design, composition, and magnetic properties. Graphs, table, and illustrations. (T1, P16, SG-n)

147-T. Toolsteels for Hot Forming. (In French.) M. Pierre Henry. *Métallurgie et la Construction Mécanique,* v. 83, Nov. 1951, p. 893, 895-897, 899.

Use of Cr, Cr-Ni-Mo, Cr-Mo, Cr-W, and high-speed steels; conditions of use, influence of composition and heat treatment, and future possibilities. Photographs and table.
(T5, TS)

148-T. Using Special Steels in New Central Power Plants. (In French.) J. Ricard. *Métallurgie et la Construction Mécanique,* v. 83, Nov. 1951, p. 905, 907-909, 911-913.

A historical outline. Use of special steels, particularly for gas turbines. Resistance to high temperature and corrosion. Charts and photograph. (T25, AY, SS)

149-T. Heat Resisting Steels Used in the Construction of Gas Turbines and Aircraft Turbojet Engines. (In French.) E. Morlet. *Métallurgie et la Construction Mécanique,* v. 83, Nov. 1951, p. 915, 917-919, 921, 923.

Operating conditions of the main parts of gas turbines, refractory steels or alloys and their properties and applications, austenitic steels and alloys, and nonferrous alloys. Tables and charts.
(T25, Q general, SS, AY, SG-h)

150-T. Alloy Steels in the Construction of Automobiles. (In French.) Pierre Sutter. *Métallurgie et la Construction Mécanique,* v. 83, Nov. 1951, p. 925, 927, 933.

Compositions, properties, and applications. (T21, AY)

151-T. An Aluminum Car for Transportation of Alumina. (In French.) Jean Reinhold. *Revue de l'Aluminium,* v. 28, Dec. 1951, p. 439-447.

Closed-hopper cars of large capacity built for transportation of bulk alumina by a French company. (T23, Al)

152-T. Papermaking. (In French.) Pierre Prévot. *Revue de l'Aluminium,* v. 28, Dec. 1951, p. 433-438.

Al alloy hood 52.6 ft. long and 16.5 ft. wide, built over papermaking machinery in a French plant, to evacuate steam given off by the paper. (T29, Al)

153-T. History and Progress of French Light-Alloy Railroad Cars. (In French.) *Revue de l'Aluminium,* v. 28, Dec. 1951, p. 447-450.

Various types of cars, built for various specialized freight-handling applications. (T23, Al)

154-T. The Couvral Roof. (In French.) Rene Rouaud-Perisse. *Revue de l'Aluminium,* v. 28, Dec. 1951, p. 454-458.

The Couvral process uses Al-Mn strips 0.026 in. thick having dovetail grooves which are fastened to slats. This fastening process, which avoids making holes in the roofing material, is most efficient as it can stand the tearing effort represented by a load of 545 lb. per sq. ft.
(T26, K13, Al)

155-T. The 17th Annual Nautical Exposition. (In French.) André Chevrier. *Revue de l'Aluminium,* v. 28, Dec. 1951, p. 459-465.

Applications of Al and its alloys in ships, boats, marine engines, and accessories. (T22, Al)

156-T. Use of Aluminum for the Construction of Wiring for Short Circuited Rotors for Asynchronous Motors. (In Freneh.) J. Le Monnier. *Revue de l'Aluminium,* v. 28, Dec. 1951, p. 466-469.

Production by gas welding rolled bars onto the rims. (T1, K2, Al)

157-T. Heat Resistant Steels for the Glass Industry. (In German.) H. Kalpers. *Sprechsaal für Keramik; Glas; Email,* v. 85, Feb. 5, 1952, p. 53-54.

Composition and mechanical properties of three types of heat resistant steels; carbon steels, Si steels, and Cr steels. (T29, Q general, SG-h)

158-T. Recent Uses of Aluminum in the Chemical Industry. (In German.) P. Juniere. *Werkstoffe und Korrosion,* v. 3, Jan. 1952, p. 1-5.

Previously abstracted from *Aluminum Suisse.* See item 486-T, 1951. (T29, Al)

159-T. Aluminum as Material in the Dairy Plant. (In German.) David Stüssi. *Werkstoffe und Korrosion,* v. 3, Jan. 1952, p. 5-11.

Al, especially the Al alloy "anti-

corrodal", is far superior to other materials for dairy equipment and containers. 22 ref. (T29, Al)

160-T. Cast Structural Material. (In German.) W. Hartmann. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, Jan. 21, 1952, p. 65-73.

Advantages and disadvantages of cast iron and welded or forged steel for machine parts. Close cooperation of the designer with the foundryman is recommended. Data are graphed and tabulated. (T7, CI, ST)

161-T. Requirements of Friction Bearings, Especially Those Made of Synthetic Resins. (In German.) Heinrich Mäkelt. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, Feb. 11, 1952, p. 138-145.

Review of literature compares the properties and qualities of different metallic and nonmetallic bearing materials. Includes metallic materials and graphites. Illustrations, graphs, and tables. 45 ref. (T7, Q general, SG-c)

162-T. Equipment for Cold Forming. (In French.) L. Colombier. *Métallurgie et la Construction Mécanique,* v. 83, Nov. 1951, p. 901-903.

Carbon toolsteels and low and high-alloy toolsteels, their properties and heat treatment. Progress being made on improvement of performance. Charts. (T5, TS)

163-T. (Book) **Aluminum Powder and Pastes.** 84 pages. Reynolds Metals Co., 2500 S. Third St., Louisville, Ky.

Powdered Al in Al paints, iridescent auto finishes, roof coatings, and the like; and describes chemical reactions which provide heat without flames, sea markers to help locate downed airmen, bombs whose destructive power is doubled by powdered Al, powder metallurgy, surgery, silicosis treatment, and other developments. (T29, L26, H general, Al)

164-T. Titanium. William S. Cockrell. *Aeronautical Engineering Review,* XX v. 11, Mar. 1952, p. 44-46, 54.

See abstract of "Titanium in Aircraft Production", *Light Metal Age;* item 43-T, 1952. (T24, K general, G general, J general, Ti)

165-T. Stainless Steel Boosts Service From Plant Units. *Coal Age,* v. 57, Mar. 1952, p. 92-95.

Application of stainless plates, screens, and fittings at Sunnyhill Coal Co., New Lexington, Ohio. Problems of screen blinding, choked chutes, corroding of pipe threads and adjusting screws are solved. (T28, SS)

166-T. The Development of a Temperature Limit and Overheat Control. N. D. B. Harris. *Gas Journal,* v. 269, Feb. 27, 1952, p. 525-528.

Various metal combinations used in the cut-off system. Diagrams. (T8, S16)

167-T. Redesign for Die Casting. Fenton Miller and James Samways. *Machine Design,* v. 24, Mar. 1952, p. 143-145.

Adoption of pressure die-cast Al construction of parts for small power lawnmowers. (T10, E13, Al)

168-T. Gas Turbine Engine Materials. R. H. Thielemann, J. C. Mertz, and W. P. Eddy, Jr. *Machine Design,* v. 24, Mar. 1952, p. 216, 218, 220, 223, 225. (A condensation.)

Various materials which can be substituted for stainless alloys in high-temperature service. Need for better materials is emphasized. (T25, SG-h)

169-T. Recent Developments in Francis Turbines. Wm. J. Rheingans. *Mechanical Engineering,* v. 74, Mar. 1952, p. 189-196, 211.

Trend in turbine design is toward reduction in over-all weight and cost by use of welded plate steel construction, and by increasing the casing-inlet velocities. The increased use of stainless steels and Al bronzes to resist pitting corrosion and erosion results in a reduction of maintenance and downtime and other advantages. (T25, R2, SS, CN, Al)

170-T. Aluminium As a Shipbuilding Material. E. C. B. Corlett. *Metal Industry,* v. 80, Feb. 29, 1952, p. 163-167. (A condensation.)

Materials and their present status, methods available for joining them; future trends. (T22, K general, Al)

171-T. IBM: Major User of Metal Powder Parts. *Precision Metal Molding,* v. 10, Mar. 1952, p. 34-36.

Various reasons for the use of powder parts. Applications in IBM business machines. (T10, H general)

172-T. To Take Full Advantage of Die Castings, Westinghouse Has Redesigned Its Fan Motor Housings. *Precision Metal Molding,* v. 10, Mar. 1952, p. 32-33, 73-75.

Al die-cast motor housing which is flexible and ductile. (T7, Al)

173-T. A Look at the First Ford Overhead-Valve Engine. *SAE Journal,* v. 60, Mar. 1952, p. 35-41. (Based on "The New Ford Six-Cylinder Engine," by E. S. MacPherson.)

Includes illustrations with descriptive captions. Compares new engine with L-head counterpart; constructural features, how engine is lubricated, and performance data. Vari-

ous metals used, i.e. Al pistons, Cu radiators, etc. (T21, Al, Cu, ST)

174-T. Building the Walker Bulldog Tank. *SAE Journal,* v. 60, Mar. 1952, p. 54-58. (Based on "Walker Bulldog —Its Design and Production", by Edward N. Cole and Harold G. Warner.)

Hull fabrication, turret ball-bearing race manufacture, and turret and hull assembly. Mentions SAE 4140 steel and cast iron. Principal fabrication operations are machining, welding, and induction hardening. (T2, AY, CI)

175-T. Astronomy and the Measurement of Time. (In French and German.) E. Guyot. *Pro-Metal,* v. 4, Dec. 1951, p. 915-916.

The main factor in development of the modern precision timepiece is shown to be the increase in the quality of the metals used. (T9)

176-T. Copper Alloys in the Manufacture of Unfinished Watch Movements. (In French and German.) Philippe De Coulon. *Pro-Metal,* v. 4, Dec. 1951, p. 917-918.

Various processes necessary for the manufacture of so-called "blank" movements. Emphasizes the role of certain Cu alloys, usually 60% Cu, 38% Zn, and 1.5-2% Pb. (T9, Cu)

177-T. Problems of Watch Manufacturing. (In French and German.) Andre Chappuis. *Pro-Metal,* v. 4, Dec. 1951, p. 919-921.

In particular the problems presented by correct choice of alloys for watch springs. Properties of various alloys used for this purpose. (T9)

178-T. Watch Cases of German Silver. (In French and German.) *Pro-Metal,* v. 4, Dec. 1951, p. 921-922.

The mechanical properties necessary. German silver, actually a brass with Ni additions, is used most widely. Working methods and various plating methods.
(T9, G general, Q general, L17, Cu)

179-T. Brass in the Production of Escapement Levers. (In French and German.) A. Simon-Vermot. *Pro-Metal,* v. 4, Dec. 1951, p. 923-925.

Mechanical and structural properties required of the materials. Testing methods for such alloys.
(T9, Q general, Cu)

180-T. Copper Alloys in the Watch Industry. (In French and German.) *Pro-Metal,* v. 4, Dec. 1951, p. 928-933.

Alloys used in the industry and their properties. Data are charted. (T9, Cu)

181-T. The Manufacture of Watch and Clock Cases. (In French and German.) Charles Hirschy. *Pro-Metal,* v. 4, Dec. 1951, p. 934-936.

Various factors, such as design, price, material, and finish. (T9)

182-T. Theoretical Basis of Heat Production in the High-Frequency and Electric-Arc Furnaces. (In German.) Fritz Walter. *Archiv für das Eisenhüttenwesen,* v. 22, Nov.-Dec. 1951, p. 355-365.

Heat production by alternating electromagnetic fields of force, and the influence of a.c. frequency, permeability, and electrical conductivity of the radiator upon energy consumption. (T5)

183-T. Possibilities of Application for Cast Aluminum, Particularly in Automobile Construction. Curt Bücken. (In German.) *Metall,* v. 6, Mar. 1952, p. 123-128.

A number of applications not usually considered in the German aluminum industry. Details of casting, welding, and surface treatment. Data are tabulated.
(T21, E general, K general, L general, Al)

184-T. Recommendation for Design and Operation of Molybdenum-Wound Hydrogen Atmosphere Furnaces. W. P. Keith. *American Ceramic Society Bulletin,* Mar. 1952, p. 76-78.

Use of Mo as winding on furnace tubes. Temperature-resistivity characteristics of Mo. Refractory requirements for this type of furnace. (T5, P11, Mo)

185-T. Skyscrapers Clad in Metal Coats. *Business Week,* Mar. 29, 1952, p. 72-74, 77.

Four Pittsburgh office buildings in the final stages of construction. Three are clad in stainless steel, one in aluminum. Primary advantages are weight and space saving and ease of maintenance.
(T26, Al, SS)

186-T. Industrial Applications of Stellite. B. J. MacKenzie. *Canadian Metals,* v. 15, Mar. 1952, p. 48, 51-52.

Stellite has very high wear resistance and keeps its hardness up to 1800° F. This property combined with a low coefficient of friction and high corrosion resistance gives it unique applications.
(T general, Q9, R general, Co)

187-T. Basic Structural Design for Transmission Substations Including Light Metals. *Electrical Engineering,* v. 7, Apr. 1952, p. 344-350. (To be published in *AIEE Trnasactions,* v. 71, 1952).

A classification of structures for transmission substations with recommendations for choosing suitable materials and designs. Steel, aluminum, wood, and concrete are con-

sidered. Methods of determining design loadings; industry practices regarding design and fabrication standards. 22 ref. (T1)

188-T. Skyscraper Sheathed in Aluminum. *Engineering News-Record,* v. 148, Apr. 3, 1952, p. 67-71.

Design and construction of Alcoa building in Pittsburgh. (T26, Al)

189-T. Lead Vessels in Radioactive Work. C. Fisher. *Industrial Chemist and Chemical Manufacturer,* v. 28, Mar. 1952, p. 120-124.

Various types of equipment which have been designed to afford protection from harmful radiation. (T29, Pb)

190-T. Specifications for Design of Hot Metal Ladles. *Iron and Steel Engineer,* v. 29, Mar. 1952, p. LS-1-LS-13.

Reproduces AISE Standard No. 9 (Tentative), Sept. 30, 1951. Simplified design and analysis procedures for open-top hot-metal ladles. Results compared with laboratory tests and actual design practice. (T5, S22, D9)

191-T. Precision Control Speeds Shell Production. W. G. Patton. *Iron Age,* v. 169, Apr. 3, 1952, p. 127-131.

Production of artillery shells at Chevrolet's St. Louis plant, starting with the carbon steel billets through packaging of shells for shipment. Operations include hot forging, rough and finish turning, nosing, finish grinding, welding and painting. (T2, CN)

192-T. Equipment for Use With High-Strength Hydrogen Peroxide. Noah S. Davis, Jr., and John H. Keefe, Jr. *Journal of the American Rocket Society,* v. 22, Mar.-Apr. 1952, p. 63-69.

Results of compatibility tests on various materials, including metals, plastics, and lubricants. General equipment-design considerations and methods of preparing the equipment for H_2O_2 service. Pumps, containers, piping, flexible hose, valves, and reactors are examples of the equipment. (T29, Al, Cu, Pb, Fe, Li, SS)

193-T. A Design for Standard Resistance Coils. C. R. Barber, A. Gridley, and J. A. Hall. *Journal of Scientific Instruments,* v. 29, Mar. 1952, p. 65-69.

A new method for the construction of resistance coils especially suitable for use in bridge construction. Full details of methods used in the construction and in heat treatment of the wire in order to obtain good stability. Manganin wire is used. (T1, J general, Cu)

194-T. Light Alloy in Agricultural Machinery. *Light Metals,* v. 15, Mar. 1952, p. 90-92.

Several farm implements in which Al and other light alloys have found practical application. (T3, Al)

195-T. Monumental Doors in Cast Light Alloy. *Light Metals,* v. 15, Mar. 1952, p. 95.

Doors installed in new British Government office building. (T26, Al)

196-T. Extrusions and Die Castings in a New Textile Machine. *Modern Metals,* v. 8, Mar. 1952, p. 34.

Application and advantages of Al. (T29, Al)

197-T. The Aluminum Food Can in Europe. *Modern Metals,* v. 8, Mar. 1952, p. 26-28, 30-32.

Successful packaging of a great variety of foodstuffs in Al cans. (T29, Al)

198-T. Preserving Tanks and Trucks With Aluminum Foil. *Modern Metals,* v. 8, Mar. 1952, p. 46, 49.

How foil is protecting tanks, trucks and other vehicles against water damage during storage and shipment. (T10, R10, Al)

199-T. Research on Dental Materials at the National Bureau of Standards; a Review and Bibliography. I. C. Schoonover and Wilmer Souder. *National Bureau of Standards,* Circular 497, Aug. 15, 1950. 14 pages.

Physical and chemical properties and specifications of metallic and nonmetallic dental materials. (T10, P general, S22)

200-T. Military Vehicles Sealed for Storage. *Steel,* v. 130, Mar. 24, 1952, p. 81.

Tests show laminated seal with Al foil keeps moisture out. New seal lasts longer. Ventilator prevents condensation and evaporation inside hulls. (T2, T10, R10, Al)

201-T. Heating in Vacuo by an External Radiation Source. A. Leemans and R. Kompfner. *Vacuum,* v. 1, July 1951, p. 203-204.

A tungsten-filament lamp and an ellipsoidal reflector may be used to heat miscellaneous small objects. Theory, and several applications in electron-tube construction, localized heating, and soldering or brazing. (T5, K7, K8, J general)

202-T. Use of Cast Metal Offers Important Savings for Limited Manufacture. Frank Charity. *Western Metals,* v. 10, Mar. 1952, p. 41-43.

Use of castings as substitutes for tooling of metal, plastic, rubber, and leather products in small or moderately large quantities. Comparative mechanical and physical properties of five types are tabulated. Foundry practice and finishing methods. (T6, E general)

203-T. Light-Alloy Ship Funnels. (In French.) André Chevrier. *Revue de l'Aluminium,* v. 29, Jan. 1952, p. 18-23.

Advantages and application to the trans-Atlantic liner "United States". (T22, Al)

204-T. Esthetic Contributions of Aluminum to One of the New Bridges at Lyon. (In French.) Andre Mogaray. *Revue de l'Aluminium,* v. 29, Jan. 1952, p. 25-27.

Cast figures and rail grillwork. (T26, Al)

205-T. Special Engines. (In French.) Maurice Victor. *Revue de l'Aluminium,* v. 29, Jan. 1952, p. 31-39.

Various types of guided missiles, with emphasis on their use of Al and Mg alloys. (T2, Al, Mg)

206-T. Fabrication of Mountain-Rescue Equipment. (In French.) M. Devies. *Revue de l'Aluminium,* v. 29, Jan. 1952, p. 40-41.

Sledges, collapsible stretchers, portable radios, etc., with emphasis on applications of light alloys. (T10, Al, Mg)

207-T. Aluminum in Irrigation Equipment. (In French and German.) Ernst Ramser. *Aluminium Suisse,* v. 2, Jan. 1952, p. 14-23.

Al alloys used in various irrigation systems and their advantages. Photographs and tables. (T4, Al)

208-T. Mass Production of Light-Metal Automobile Frames. (Concluded.) (In French and German.) Baron. *Aluminium Suisse,* v. 2, Jan. 1952, p. 26-33.

Use of cast pieces, assembly, spot welding, and painting. The different Al alloys used. (T21, K3, L26, Al)

209-T. Stratospheric Flight and Metallurgy. *Aeroplane,* v. 82, Mar. 21, 1952, p. 334-335. (Based on lecture by P. L. Teed.)

Some special problems, including wear of commutator parts and various effects on corrosion and mechanical properties of miscellaneous ferrous and nonferrous metals. (T24, R general, Q general)

210-T. Production and Metallurgical Characteristics of Hollow Mining Drill Steel in Australia. Daniel Clark. *Australasian Institute of Mining and Metallurgy, Proceedings,* new ser., Mar. 31-June 30, 1947, p. 205-233.

Historical background, manufacture, heat treatment, fatigue failures, and establishment of a central testing station. Illustrations and photomicrographs. 19 ref. (T28, TS)

211-T. Steel Wire Ropes for the Mining Industry. W. Anderson. *Australasian Institute of Mining and Metallurgy, Proceedings,* new ser., Mar. 31-June 30, 1947, p. 301-336.

History, materials, characteristics affecting economy, operating life and serviceability, properties of construction and stresses met, drum and sheave sizes, sheave bearing pressures, storage, handling and maintenance of ropes in service, common factors affecting rope life, and inspection. (T28, CN)

212-T. SAE Engineers Are Cool to Copper Substitutes in Radiators. *Automotive Industries,* v. 106, Apr. 1, 1952, p. 42-43, 102.

Discussion by a panel of experts, appraising Al and copper-clad steel in regard to corrosion, soldering, and other factors. (T21, R4, Al, ST)

213-T. High Frequency Heating Practice. C. E. Eadon-Clarke. *Electronic Engineering,* v. 24, Apr. 1952, p. 210-212.

Illustrated survey. (T2, F1)

214-T. The Role of Castings in Mechanical Engineering Design. W. Hartmann. *Engineers' Digest,* v. 13, Mar. 1952, p. 83-86. (Translated and condensed.)

Previously abstracted from *Zeitschrift des Vereines Deutscher Ingenieure.* See item 160-T, 1952. (T7, CI, ST)

215-T. New Super-Alloys. *Metal Progress,* v. 61, Mar. 1952, p. 127-146.

See abstract of "Gas Turbine Engine Materials," by R. H. Thieleman, J. C. Mertz, and W. P. Eddy, Jr. *Machine Design,* item 168-T, 1952. (T25, SG-h)

216-T. High-Temperature Alloy for Rotor Blades. *Metal Progress,* v. 61, Apr. 1952, p. 148, 150, 154. (Condensed from "Development of a High-Temperature Alloy for Gas Turbine Rotor Blades", G. T. Harris and H. C. Childs.

Previously abstracted from "Symposium on High-Temperature Steels and Alloys for Gas Turbines", *Iron and Steel Institute.* See item 356-T, 1951. (T25, Co, SG-h)

217-T. Selection and Treatment of Die Steels. Part I. Stewart G. Fletcher. *Tool Engineer,* v. 28, Apr. 1952, p. 41-44.

Classification of die steels and various heat treatments. Tabular data on mechanical properties. (To be continued.) (T5, Q general, CN, TS)

218-T. Welded Plate Steel for Francis Turbines. *Welding Engineer,* v. 37, Apr. 1952, p. 36-39. (Condensed from "Recent Developments in Francis Turbines".)

Previously abstracted from *Mechanical Engineering;* item 169-T, 1952. (T25, R2, SS, CN, Al)

219-T. Metallic Lubricants. N. C. Amen. *Steel,* v. 130, Mar. 24, 1952, p. 86.

A study of MoS_2 and Cu-Pb alloys for their individual as well as collective contribution in maintaining bearing surface areas against wear. Petroleum products serve as a vehicle or binder for these materials. (T7, Q9, Cu, Pb)

220-T. (Book) **The Gas Turbine Manual.** R. J. Welsh and Geoffrey Waller. 243 pages. 1951. Temple Press, Ltd., Bowling Green Lane, London, E.C.1, England.

History, fundamental theory and operational features of the various types of turbines. Properties required in construction materials. Includes glossary. 46 ref. (T25, SG-h)

221-T. High Temperature Materials For the Gas Turbine. A. R. Edwards. *Australasian Engineer,* Feb. 7, 1952, p. 64-68. (From Symposium on "Modern Trends in Non-Ferrous Metals and Alloys".)

Main requirements for heat resistant materials in turbine engines. Creep resistance is the most important criterion in selecting alloys for high-temperature service, time-extension curves being the basis of design data. The best of the current alloys are grouped according to their applications—significant features of their compositions and microstructures. Future trends. 14 ref. (T25, Q3, M27, SG-h)

222-T. Molded Wings. *Aviation Age,* v. 17, Apr. 1952, p. 46-53.

Forming of plastic and metal wings. Tabular data give strength and property comparisons. (T24, Q general, CN, Al)

223-T. Aluminium as a Shipbuilding Material. E. C. B. Corlett. *Engineering,* v. 173, Mar. 28, 1952, p. 413-414; *Metallurgia,* v. 45, Mar. 1952, p. 121-126.

Previously abstracted from *Metal Industry.* See item 170-T, 1952. (T22, K general, Al)

224-T. Alloy Conservation in Furnace Construction. Kenneth W. Stookey. *Industrial Heating,* v. 19, Apr. 1952, p. 636.

Scarce Ni and Cr can be saved by redesign or material substitution. (T5, Ni, Cr, AY)

225-T. Zinc Versus Aluminum Lithographic Plates. Charles F. King. *Inland Printer,* v. 129, Apr. 1952, p. 58-60, 98-99, 101. (T9, Zn, Al)

226-T. Modern Permanent Magnet Practice. F. G. Tyack. *Machinery Lloyd* (Overseas Edition), v. 24, Mar. 29, 1952, p. 77, 79, 81-84.

Applications for permanent magnets, performance curves, materials, manufacture; and effect of temperature. (T1, P16, SG-n)

227-T. Technical Background for Further Tin Conservation. R. R. Hartwell. *Modern Lithography,* v. 20, Mar. 1952, p. 49, 51, 53, 113, 115; Apr. 1952, p. 61, 63.

In relation to NPA Order M-25 with special reference to electrolytic tin plate for food containers, and substitutes for hot-dipped plate. Relative corrosion resistance to different foods of different thicknesses of tin plating. (T29, L17, R7, Sn, CN)

228-T. Use of Aluminum Pipe in Oil Country Applications. William B. Moore, Jr. *Petroleum Engineer,* v. 24, Apr. 1952, p. D28, D30, D32.

An illustrated survey of mechanical and corrosion resistant properties and uses. (T28, Q general, R general, Al)

229-T. Elastic Properties of Zinc Die Castings Are Useful for Adjustable Parts. *Precision Metal Molding,* v. 10, Apr. 1952, p. 48, 108, 111.

Illustrates above by briefly describing some parts made by Partlow Corp., New Hartford, N. Y., for a temperature-indicating controller. (T8, E13, Zn)

230-T. Expanded Metal. Robert P. Ingols. *Product Engineering,* v. 23, Apr. 1952, p. 199-202.

Mechanical, dimensional, and other properties of different designs of carbon steel, stainless Al, and special-property alloys. A few of the many applications are machine guards, ventilating panels, functional and decorative parts in electrical assemblies. Data are tabulated. (T7, T1, Q general, CN, SS, AY)

231-T. Super-Purity Aluminium for Roofing. *Sheet Metal Industries,* v. 29, Apr. 1952, p. 344. (T26, Al)

232-T. Use of Light Alloys for Railway Trucks; Some Details of French Practice. J. Grindrod. *Sheet Metal Industries,* v. 29, Apr. 1952, p. 332-333.

Includes physical and mechanical properties. (T23, P general, Q general, Al)

233-T. A Strapping Business Built on Stainless. *Steel Horizons,* v. 14, Spring, 1952, p. 8-9.

Use by A. J. Gerrard & Co., Melrose Park, Ill., of stainless steel in strapping applications. (T5, SS)

234-T. How Are We Doing on Aircraft Propulsion? *Steel Horizons,* v. 14, Spring 1952, p. 10-13.

Brief survey emphasizing applications of stainless steel. (T24, SS)

235-T. American Wines Go Europe One Better. *Steel Horizons,* v. 14, Spring 1952, p. 14-15.

Use of stainless steel in wine production at Paul Masson Vineyards, Saratoga, Calif. (T29, SS)

236-T. Stainless Mesh Dries Wet Gases. *Steel Horizons,* v. 14, Spring 1952, p. 18-19.

Applications of stainless steel knitted wire mesh, made by Otto H. York Co., East Orange, N. J. (T29, SS)

237-T. They're Streamlining Tooth Brace Design. *Steel Horizons,* v. 14, Spring 1952, p. 22-23.

Use of stainless and tool steel in production of dental braces. (T10, SS, TS)

238-T. Ryan Does Tricks With Scrap. *Steel Horizons,* v. 14, Spring, 1952, p. 25.

Use of stainless steel scrap at Ryan Aeronautical Co., San Diego, for making pickling baskets. (T5, SS)

239-T. Wire as a Material for Product Fabrication. Paul F. Titchener. *Wire and Wire Products,* v. 27, Apr. 1952, p. 362-365, 418-419.

Facts on wire and its fabrication into wire products. (T general, F28, ST)

240-T. Steel Grain Silos. (In French.) P. Peissi. *L'Ossature Metallique,* v. 17, Mar. 1952, p. 127-133.

Advantages include stability, rapid construction, noncombustibility, lack of possible injurious effect on grain, etc. Methods of construction. (T3, CN)

241-T. Production of UONI-13, UP1, and UP2 Electrodes on Heavy-Duty Presses Using High Pressures. (In Russian.) K. V. Petran. *Avtogennoe Delo,* v. 22, Sept. 1951, p. 16-19.

Mass production of coated electrodes for carbon steel welding. Mechanical properties of deposited metal from various electrodes are tabulated. (T5, K1, CN)

242-T. Manufacture of UONI-13/45 and UONI-13/55 Electrodes on Heavy-Duty Electrode Presses. (In Russian.) K. V. Rozzhivin. *Avtogennoe Delo,* v. 22, Aug. 1951, p. 21-22.

Ways of applying better quality electrode coatings for increasing production. (T5)

243-T. Electrodes for Welding Cutting Tools and Machine Parts. (In Russian.) A. I. Serpokrylov, D. Ia. Sobantsev, F. I. Bukin, and N. F. Varik. *Avtogennoe Delo,* v. 22, Aug. 1951, p. 22-23.

The preparation of high speed steel electrodes. (T5, TS)

244-T. The Curtain Wall Comes of Age. *Architectural Forum,* v. 96, Apr. 1952, p. 135-140.

Construction of two office buildings using metal-faced concrete—precast stainless-faced structural wall sections, and Al skin and sprayed concrete. Fabrication and corrosion resistance. (T26, Al, SS)

245-T. Materials in Airframe Construction. H. H. Grover and S. A. Gordon. *Battelle Technical Review,* v. 1, Apr. 1952, p. 36-39.

Table lists a few of the different materials currently in use in airframe construction and shows approximate values of some strength properties of each. A simple example illustrates the relationship of material properties to design configuration. General trends. (T24, Q23)

246-T. Aluminum Magnet Wire. Robert W. Carson. *Electrical Manufacturing,* v. 49, May 1952, p. 134-139, 312, 314, 316, 318.

Traditional use of Cu as an electrical conductor is being challenged by Al on a cost basis. Recent price trends suggest that the initial production applications for Al magnet wire presage a growing field of use. Includes data on physical and mechanical properties of Cu and Al. (T1, Q general, P general, Al, Cu)

247-T. For Certain High-Temperature Applications Liquid Metals Are Good Heat-Transfer Agents. Thomas Trocki. *General Electric Review,* v. 55, May 1952, p. 22-25, 60.

Advantages, disadvantages, and corrosion problems. Equipment for use of Na and Na-K alloys. (T5, R6, Na, K)

248-T. Use of Beryllium Copper in Plastic Molds. Malcolm A. Nichols. *India Rubber World,* v. 126, Apr. 1952, p. 80-81.

Pressure casting of the molds, properties of the molds, types of hobs, advantages of using Be-Cu, and applications other than for plastic molds. (T29, E16, Cu)

249-T. Trends to Aluminum in Power Distribution. *Modern Metals,* v. 8, Apr. 1952, p. 36, 38.

Experience with Al transmission lines. (T1, Al)

250-T. For Selling Meat—Aluminum Platters and Pans. *Modern Metals,* v. 8, Apr. 1952, p. 49-50, 52, 54. (T10, Al)

251-T. The Outlook for Aluminum in the Electrical Industry. H. W. Biskeborn. *Modern Metals,* v. 8, Apr. 1952, p. 56-58, 60, 62.

Some of the more important accepted and potential applications

for Al in the electrical industry. Tabulated data covers tensile strength of Al and Pb.
(T1, Q27, Al, Pb)

252-T. Flame Radiation and Furnace Efficiency. Max Davies. *Murex Limited Review,* v. 1, 1952, p. 233-238.

International joint experiments conducted on a specially constructed furnace at the Royal Netherlands Steel Co., Ijmuiden, Netherlands. Construction diagram. (T5)

253-T. Chrome Stainless: Easing the Pinch. Richard E. Paret. *Steel,* v. 130, Apr. 28, 1952, p. 79-80.

Certain high and low-Cr steels possess good mechanical properties, high fabricability and are excellent replacements in stainless applications formerly requiring Ni.
(T general, Q general, SS)

254-T. The Preparation of Crucibles From Nitrides. L. S. Foster. *U. S. Atomic Energy Commission,* AECD-2942, July 1945, 60 pages.

Methods developed for manufacturing TiN and ZrN consist of first forming the corresponding hydride and then converting it to the nitride by reaction with ammonia. Crucibles were made by standard ceramic techniques and fired in high-temperature induction furnaces. Hydrostatic pressing gave crucibles with very low porosities. Boron nitride showed promise as a crucible material and as an insulating material for the construction of high-temperature furnaces. Fe and Ce could be melted in nitride crucibles with appreciable contamination, but Be could not. Diagrams, tables, and graphs. 39 ref.
(T29, T5, B19)

255-T. Honeycomb Structures Are Strong. James Blane. *Western Machinery and Steel World,* v. 43, Apr. 1952, p. 90-91, 120.

Production and applications of Al honeycomb sandwiches used in aircraft construction. (T24, Al)

256-T. Assembly-Line Construction of Light-Alloy Automobile Bodies. (In French and German.) J. Baron. *Aluminium Suisse,* v. 1, Nov. 1951, p. 206-219; v. 2, Jan. 1952, p. 26-33.

Use of Al alloys in the production of automobiles with respect to choice of alloy and forming technique. (T21, G general, Al)

257-T. Aluminum in the Canning Industry. A Short Review With Particular Regard to Developments in Norway. (In French and German.) D. Nickelsen and S. Buschmann. *Aluminum Suisse,* v. 2, Mar. 1952, p. 41-54.

History of use of aluminum cans for various types of foods in Norway. Surface treatment necessary if cans are to be stored over a longer period of time, particularly "eloxidizing". New Al alloys were tested for suitability as canning material. Acid content of foods was investigated in order to determine what foods are suitable for canning in this new type of material. Economic aspects considered. (T29, Al)

258-T. New Light Metal Construction for Shipping. (In French and German.) W. Fiedler. *Aluminum Suisse,* v. 2, Mar. 1952, p. 56-59.

New German applications, such as lifeboats, gangplanks, air tanks, and stacks. Advantages, particularly light weight and corrosion resistance. (T22, Al)

259-T. Light-Metal Crane Construction. (In French and German.) W. Stadelmann. *Aluminum Suisse,* v. 2, Mar. 1952, p. 60-63.

Construction details of various light metal cranes in the U. S., Germany, and Canada, with particular emphasis on savings in weight and costs. (T5, Al)

260-T. Aluminum Storage Tank for Fatty Acids. (In French and German.) K. J. Van de Loo. *Aluminum Suisse,* v. 2, Mar. 1952, p. 64-65.

Structural details of a tank manufactured and built in Holland.
(T29, Al)

261-T. The Manufacture of a Wind Instrument. (In French and German.) Fr. Hirsbrunner. *Pro-Metal,* v. 5, Feb. 1952, p. 945-948.

Types of alloys used; methods for turning, brazing, hammering, and other operations. Materials are ferrous and nonferrous. (T9, G general)

262-T. Charts for Graphical Calculation of Long Aerial Cables With Aluminum-Base Conductors of 80 and 94.3 Sq. Mm. Cross Section. (In French.) Auguste Dalmasso. *Revue de l'Aluminium,* v. 29, Feb. 1952, p. 46-49.

Two new charts make it possible to determine the mechanical characteristics of overhead conductors having level spans up to 4920 ft. as well as the corrections of tension and span used for precise definition of conditions of installation. Includes numerical example.
(T1, Q general, Al)

263-T. Light-Alloy Automobiles. New Paris Autobuses. (In French.) Jean Keraval. *Revue de l'Aluminium,* v. 29, Feb. 1952, p. 61-65.

Use of Al alloys in diesel-powered buses. 27% of the weight is saved. Other advantages. (T21, Al)

264-T. The English Trawlers "Red Rose" and "Red Hackle". (In French.)

Revue de l'Aluminium, v. 29, Feb. 1952, p. 66-67.
Use of Al alloys. (T22, Al)

265-T. Aluminum Sun Shield for the Camirant Substation. (In French.) *Revue de l'Aluminium*, v. 29, Feb. 1952, p. 79.
Large sun shield composed of 105 mobile slats moved by three hydraulic jacks. Made of anodized Al, except the frame, which is of steel. (T26, Al)

266-T. Application of Light Metals in Self-Supporting Bodies of Buses, Trolley Buses, and Railroad Cars. (In German.) Arne Brinck. *Aluminium*, v. 27, Oct. 1951, p. 36-39.
Norwegian experiences. (To be continued.) (T21, T23, Al)

267-T. Reduction in Operating Costs Achieved by Using Light Metals for "Self-Supporting" Electric Cars. (In German.) M. Preuss. *Aluminium*, v. 28, Jan.-Feb. 1952, p. 37-39.
Calculates savings in energy consumption and in wear, etc., achieved by use of Al alloys because of weight reduction. Tables and graphs. (T23, Al)

268-T. Light Metals in Modern Structures. (In German.) E. W. Pleines. *Aluminium*, v. 28, Mar. 1952, p. 69-74.
Technical and economic advantages. Review of noteworthy light-metal structures. New hangars at London airport. (T26, Al)

269-T. Aluminum as a Construction Material for the Chemical Industry. (In German.) E. Franke. *Aluminium*, v. 28, Mar. 1952, p. 75-76.
Brief review, giving compositions of recommended alloys for corrosion resistance to various materials. 13 ref. (T29, R general, Al)

270-T. Light-Weight Construction for Drilling and Conveying Equipment. (In German.) Erich Bahke. *Erdöl und Kohle*, v. 5, Mar. 1952, p. 151-159.
Practical designs. (T28, Al)

271-T. Stainless and Acid Resistant Steels in Chemical Engineering. (In German.) Hermann Braun. *Werkstoffe und Korrosion*, v. 3, Mar. 1952, p. 93-98.
Indicates that the most highly alloyed type is not always the best for a particular application. Various types of corrosion; typical data. (T29, R general, SS)

272-T. Concerning Some Applications of Light Alloys for Bearings in Railway Equipment. (In Italian.) L. Paglialunga. *Allumino*, v. 21, Jan. 1952, p. 43-47.
Experimental results in comparison with other bearing metals show better high-temperature wear and fatigue resistance. (T7, Q7, Q9, Al, SG-c)

273-T. Titanium in Aero-Engine Construction. H. H. Hanink. *Aeroplane*, v. 82, Apr. 25, 1952, p. 494-497.
Use, properties, cost and weight analysis. Compares with high-strength alloy steels. (T24, Q general, Ti)

274-T. Prevention of Metal Plate Oxidation in Lithographic Platemaking. Charles W. Latham. *American Printer*, v. 133, May 1952, p. 24-25, 50, 52, 54, 56.
Cronak or Brunak treatment for metal lithographic plates. Prevents oxidation, simplifies platemaking, improves printing, produces sharper images, and improves grain characteristics. (T9, Zn, Al)

275-T. Platinum Metals in the Chemical Laboratory. *Chemical Age*, v. 66, Apr. 26, 1952, p. 645-648. (T29, Pt)

276-T. The Metals Used for Mechanical Springs. F. P. Zimmerli. *Metal Progress*, v. 61, May 1952, p. 97-106.
The first portion of the 1951 William Park Woodside lecture. Various steels, Cu alloys, and Ni alloys; their mechanical and other properties, compositions, and selection for specific usage. Tables. (To be continued.) (T7, Q general, ST, Cu, Ni, SG-b)

277-T. Tool Steel Investment Castings Meet Physical Requirements of Strapping Tools. *Precision Metal Molding*, v. 10, May 1952, p. 26-27, 85-87.
Materials are cast in polystyrene patterns. (T6, E15, TS)

278-T. This Industrial Designer Chooses Die Castings For Sales Appeal and Manufacturing Economy. Albert M. Sanders. *Precision Metal Molding*, v. 10, May 1952, p. 28-29, 82-84.
Work at Allen-Stevens Corp., N. Y. for die casting of a housing for a new-type, self-contained portable spray unit. Material is zinc. (T10, E13, Zn)

279-T. Lead Die Casting Protects X-Ray Film. *Precision Metal Molding*, v. 10, May 1952, p. 32.
Pb die casting made by the National Lead Co., New York, for the storage of both exposed and unexposed dental X-ray films. (T10, E13, Pb)

280-T. From Pressed Steel to Die Casting — Result — Increased Rigidity and Lower Costs. *Precision Metal Molding*, v. 10, May 1952, p. 34, 79.
How Berns Mfg. Co., Chicago, changed many of their fan com-

ponents from press-formed and welded steel units to Zn die castings. This change has resulted in a fan that operates quietly and vibrationless for a longer time and at a lower manufacturing cost. (T27, E13, Zn)

281-T. Investment Cast Cutters of Stainless Steel Have Cemented Carbide Tips. *Precision Metal Molding,* v. 10, May 1952, p. 37.

Small cutters which Chicago Pump Co. uses on its sewage comminutors. (T6, E15, SS, C-n)

282-T. Investment Castings in Aluminum Alloy for Midget-Size Centrifugal Pump. *Precision Metal Molding,* v. 10, May 1952, p. 43. (T4, E15, Al)

283-T. Sturdy Permanent Mold Castings That Resist Severe Impact. *Precision Metal Molding,* v. 10, May 1952, p. 44.

Use of Al permanent-mold castings in a special alloy containing 4% Cu and 6% Si for production of children's golf clubs and horseshoes. It casts well, has a smooth surface and adequate strength. (T10, E12, Al)

284-T. Opportunities Now for Designing With Aluminum-Coated Steel. W. B. Nixon. *Stove Builder,* v. 17, May 1952, p. 51-52, 54.

Adaptability for stove application. (T10, Al, ST)

285-T. Possibilities and Limitations in the Substitution of Light Metals for Steel and Copper. Jean Matter. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 254-256; disc., p. 265-268.

Savings that can be effected by substitution of Al alloys for steel, Cu, and Sn. Examples are use of light alloys in the place of steel for freight cars, use of Al in electric cables, saving up to 1 ton of Cu per km. of line at 60,000 volts, substitution for tinplate in the manufacture of milk cans. (T23, T1, T29, Al, ST, Cu, Sn)

286-T. The Casino *de la Girande Cote.* (In French.) *Revue de l'Aluminium,* v. 29, Mar. 1952, p. 92-93.

Use of light alloy shell-type elements, supported by circular stone walls. (T26, Al)

287-T. Transit Room of the Observatory of Paris. (In French.) *Revue de l'Aluminium,* v. 29, Mar. 1952, p. 94-95.

Double-walled Al-alloy panels are used. (T25, Al)

288-T. Magnesium in the Textile Industry. (In French.) Bernard Raclot. *Revue de l'Aluminium,* v. 29, Mar. 1952, p. 97-100.

Mg applications demonstrated at recent International Textile Exposition, Lille, France. (T29, Mg)

289-T. Rubber-Tired Cars of the Swiss Federal Railways. Comparison Between the Light-Alloy Cars Built by the *Societe Industrielle Suisse* and the *Compagnie Industrielle de Materiel de Transport.* (In French.) Jacques Valeur. *Revue de l'Aluminium,* v. 29, Mar. 1952, p. 101-109. (T23, Al)

290-T. Stainless Alloys Used In Traumatological and Orthopedic Surgery. (In Portuguese.) Lybio Antunes Maciel. *Boletim da Associacao Brasilera de Metais,* v. 7, Oct. 1951, p. 520-523; disc., p. 523-526.

Principally austenitic stainless alloys and the alloy "Vitallium". (T10, SS, Co)

291-T. (Book) **The Science of Flames and Furnaces.** M. W. Thring. 416 pages. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $6.50.

Deals with industrial furnaces from point of view that furnace of the future will be a precision tool of highest accuracy, controlled by instruments of highest sensitivity. Lays stress on gap between fundamental sciences and furnace design and use. Sections on thermodynamics and heat transfer. Chapter summaries, table of conversion factors, index, diagrams, and charts. (T5)

292-T. Iron Atoms in the Service of the Electrical Engineer. Charles Goodeve. *Engineer,* v. 193, May 2, 1952, p. 599-600.

Extracts from Kelvin Lecture. Properties, fundamental aspects, such as atomic and crystal structure, and their effects on mechanical and physical properties, including corrosion, creep, high-temperature behavior, and magnetic properties. (T1, M25, Fe, ST, SG-h)

293-T. Titanium Takes the Test. William S. Cockerell. *Finish,* v. 9, June 1952, p. 19-21.

Research of Ryan Aeronautical on use of Ti sheet and on the adaptability of machines and procedures for forming stainless steel components to the forming of Ti parts. Evaluation of varicus annealing and heat treating procedures. Hot forming procedure. High-temperature properties. (T24, Ti, SG-h)

294-T. Corrosion-Resisting Nickel Alloys and Chemical Progress. W. Z.

Friend and F. L. LaQue. *Industrial and Engineering Chemistry,* v. 44, May 1952, p. 965-971.

Summary of the corrosion resisting characteristics of the principal Ni-containing alloys. Specific applications in the manufacture of a number of chemical products, including products involving Cl, Br, Fl, and Hf; synthetic textiles such as viscose rayon, cellulose acetate rayon, and nylon; dyestuff manufacture and textile dyeing and finishing; synthetic plastics such as phenolics, alkyds, polystyrene, and organic chloride polymers; antibiotics such as penicillin, streptomycin, and chloromycetin; fatty-acid products; and corn products. 84 ref. (T29, R6, R7, Ni, SG-g)

295-T. Titanium Aircraft Engine Parts: an Analysis. H. H. Hanink. *Iron Age,* v. 169, May 15, 1952, p. 121-125.

See Abstract of "Titanium in Aero-Engine Construction," *Aeroplane;* item 273-T, 1952. (T24, Q general, Ti)

296-T. Reservoir Roof in Light Alloy. *Light Metals,* v. 15, May 1952, p. 175.

British all-welded, Al alloy, oil-tank roof. (T26, Al)

297-T. Pre-Plated Drawn Steel Wire Saves Scarce Metals. Herbert Kenmore. *Materials & Methods,* v. 35, May 1952, p. 96-98.

Steel wire plated with either Cu, brass, or Ni and then drawn to size is finding many uses in both industrial and consumer fields because of its ability to be formed without flaking of the coating. The process and typical applications. (T general, L17, ST, Cu, Ni)

298-T. Materials at Work. *Materials & Methods,* v. 35, May 1952, p. 108-111.

Includes die-cast carburetor body; rigidized-metal electronic cases; ductile-iron furnace doors; Inconel "X" brake springs; and brass high-frequency connectors. (T general)

299-T. How to Choose Spring Materials. (Concluded.) M. Gerard Fangemann. *Materials & Methods,* v. 35, May 1952, p. 112-116.

How the cost and performance of a spring depend on the material used, and how each material meets particular stress, accuracy, corrosion resistance, and shock resistance requirements. Table gives mechanical and physical properties, heat treatment, and uses of 12 common ferrous and nonferrous spring materials. (T7,Q general, R general, SG-b)

300-T. Aluminum Alloys: Automakers May Use More. J. H. Dunn and E. P. White. *Steel,* v. 130, May 19, 1952, p. 95-96, 98.

Processes and applications, including brazed Al castings, brazing Fe to Al, a clutch-housing die casting, alloy for radiators, and Al coatings including corrosion resistance aspects. (T21, K8, L18, Al, SG-f)

301-T. Stronger, Lighter Jets From Clad Metals. *Steel,* v. 130, May 19, 1952, p. 104.

Test applications of Rosslyn metal sheet (composite Cu-stainless steel) at Ryan Aeronautical Co., San Diego, for jet power plants and piston-type exhaust systems. (T25, Cu, SS)

302-T. Special Steels for Aircraft Turbines; Research and Production Activities in Sheffield. *Times Review of Industry,* v. 6, May 1952, p. 42, 45.

(T24, AY, SS, SG-h)

303-T. Valve Steels. (In English.) *Aciers fins et Speciaux Francais,* Mar. 1952, p. 60-63.

Compositions and properties. (T7, AY)

304-T. Hammer-Rod Steels. (In English.) *Aciers fins et Speciaux Francais,* Mar. 1952, p. 71-73.

Special low-alloy steels necessary for dropforging-hammer shafts. (T5, AY)

305-T. Modern Railway Track "French Style" and the Use of Special Steels. (In English.) *Aciers fins et Speciaux Francais,* Mar. 1952, p. 80-82.

Extent to which plain carbon steel and various low-alloy steels meet requirements. Recommends use of a Cr-Mn steel for tie plates and clamps. Mechanical properties. (T23, Q general, AY)

306-T. Brass Pieces or Pressure-Cast Zamak Pieces? (In French.) R. Grunberg. *Métallurgie et la Construction Méchanique,* v. 84, Mar. 1952, p. 225, 227, 229.

Relative economic and technical merits of the two materials for use in pressure-fed oil cans. (T10, Cu, Zn)

307-T. Present Possibilities of Metallic Construction for Frameworks of Buildings. (In French.) André Delcamp. *L'Ossature Métallique,* v. 17, Apr. 1952, p. 173-180.

Technical and economic advantages over cement for homes and low and tall buildings. Schematic diagrams and photographs. (T26)

308-T. Aluminum as a Material for Cable Armor. (In German.) H. J. Hilgendorff. *Aluminum,* v. 28, May 1952, p. 144-145.

Higher fatigue strength of Al as compared to Pb, and higher electrical conductivity, which is advantageous in high-frequency cables. (T1, P15, Q7, Al)

309-T. Application of Aluminum in Construction of Medium-Sized and Large Transformers. (In German.) J. Muller. *Aluminum,* v. 28, May 1952, p. 156-159.

Technical properties and economic factors of conventional transformers and those wound with Al. (T1, P15, Al)

310-T. Stability of Lead and Lead-Alloy Anodes During Electrolysis of Sulfate Solutions. (In Russian.) G. Z. Kir'iakov and V. V. Stender. *Zhurnal Prikladnoi Khimii,* v. 24, Dec. 1951, p. 1263-1273.

Numerous Pb alloys were evaluated as anodes. An alloy containing 98.68% Pb, 1.0% Ag, 0.3% Sn, and 0.02% Co showed the smallest weight loss. Effects of current density, temperature, and other factors were also investigated. Tables and graphs. 20 ref. (T29, P15, Pb)

311-T. Aluminum in Textile Industry. *Canadian Chemical Processing,* v. 36, May 1952, p. 84.

Applications based on the recent survey by the Aluminum Assoc. and the Textile Information Service. Use in spinning-frame parts, warp beams, and heddle frames. (T29, Al)

312-T. "Hot Copper Sandwich" May Increase Life Expectancy of Glass Machinery. *Ceramic Industry,* v. 58, June 1952, p. 94.

Physical and mechanical properties and possible uses of Rosslyn metal (stainless steel bonded to both sides of a Cu core) on lehrs, decorating kilns, and other high-temperature glass-processing machinery. (T29, SS, Cu)

313-T. Cemented Carbides Give Longer Life to Forming Tools, Molds. J. S. Leibson. *Ceramic Industry,* v. 58, June 1952, p. 100-101.

Use of carbides at General Electric Co.'s Porcelain Mfg. Div., for production of ceramic insulators. Used for lathe work; drilling, counterboring, and reaming; and mold work. They have eliminated an average of 11 of every 12 tool grinds. (T5, G17, C-n)

314-T. Etched Sheets Serve As Microwave Components. R. M. Barrett. *Electronics,* v. 25, June 1952, p. 114-118.

Flat-strip transmission system operates successfully above 1000 mc. The metal-and-plastic sandwiches can be produced at low cost by printed-circuit etching techniques, replacing heavy and costly hybrid junctions and other wave-guide components used in airborne radar and microwave-communication equipment. System using Alclad sheets. (T1, Al)

315-T. Thermal Aspects of Furnace Design. C. Hulse and R. J. Sarjant. *Journal of the Institute of Fuel,* v. 25, May 1952, p. 94-102.

Recent developments in applying the laws of heat transmission to furnaces, the problem being treated as one calling for simultaneous solution of equations covering the various factors in heat transmission. Attempts to determine relative magnitudes of heat transfer due to convection and to radiation. 40 ref. (T5)

316-T. Aluminum in Building. *Metallurgia,* v. 45, May 1952, p. 254-255.

A research institute canteen with light-alloy structural members; a primary school with a roof covering of very high purity Al. (T26, Al)

317-T. Aluminum vs. Copper. F. L. Church. *Modern Metals,* v. 8, May 1952, p. 25-28, 30-32.

The shift from Cu to Al in the electrical industry. Causes and some of the principal products in which Al is gaining. (T1, Al)

318-T. Titanium and the Air Force. J. N. Dick and James R. Coxey. *Modern Metals,* v. 8, May 1952, p. 35-36, 38-39.

Outlook for Ti, particularly in respect to certain fabrication difficulties, from the Air Force point of view. (T24, Ti)

319-T. Reflective Insulation. . .for Lower Fuel Costs. . .More Summer Comfort. . .Less Moisture Damage. *Modern Metals,* v. 8, May 1952, p. 40-42.

Alfol insulation made by Reflectal Corp., consists chiefly of Al foil. Different types of Alfol are designed for homes, offices, and factories. (T27, Al)

320-T. How Magnesium Lightens the Load of the Mission Priest. *Modern Metals,* v. 8, May 1952, p. 58-59.

A mission unit, consisting of a cross and corpus together with a suitable carrying trunk, is used by Catholic mission priests in their travels from one church to another. Generous use of Mg sheet and extrusions results in lighter, sturdier, more functional mission units. (T9, Mg)

321-T. The Most Exacting Kind of Mounting Alignment—for an Optical System—Accomplished by Die Casting. *Precision Metal Molding,* v. 10, June 1952, p. 26-27.

Use of Al in Kodaslide Table Viewer made by Eastman. (T9, Al)

322-T. How Chromium-Plated Aluminum Permanent Mold Castings Replace Melamine. *Precision Metal Molding,* v. 10, June 1952, p. 33.

Where exposure to heat is a condition of service, Majestic Mfg. Co., St. Louis, has replaced melamine handle brackets with Al permanent-mold castings on the oven of their coal-electric combination cooking range. (T10, Al)

323-T. Non-Standard Pinions by Powder Metallurgy Meet All Specs at Lower Cost. *Precision Metal Molding,* v. 10, June 1952, p. 34, 86.

Fe-Cu powder mixtures are sintered, carburized, and Parkerized, for use in rotary and stroke-type counters made by Durant Mfg. Co., Milwaukee. Atmospheric corrosion and wear resistance are superior to extruded brass or plated steel previously used.
(T8, H general, Q9, R3, Fe, Cu)

324-T. Die-Casting—Quickest Way to a Complete Assembly. *Precision Metal Molding,* v. 10, June 1952, p. 36-37.

Use of Zn and Al die castings in diaphragm-type air compressor. Finish machining operations have been cut to a minimum by utilizing surface finish and dimensional accuracy inherent in die castings.
(T27, Zn, Al)

325-T. Direct-Image Offset Plate. A. G. Fegert. *Printing Equipment Engineer,* v. 82, June 1952, p. 80, 106-109.

Plate was developed primarily for directory work. Al foil is laminated to moisture-proof tag stock. (T9, Al)

326-T. High-Temperature Pressure Piping. Eric A. Kerbey. *Tappi,* v. 35, May 1952, p. 203-208.

Summary of the various piping materials and recommendations for selection at various operating temperatures. Specifications, compositions. forming, welding, heat treatment, inspection, and availability.
(T27, ST, SG-h)

327-T. Aluminum Parts Help Increase Production. *Textile Industries,* v. 116, Feb. 1952, p. 185, 187.

Use of Al in yarn preparation equipment, loom beam barrels, section spools for knitting machines, and loom lays and hand rails.
(T29, Al)

328-T. Aluminum Foil Utilized in Fire Protective Clothing. *Textile Industries,* v. 116, May 1952, p. 114.

A new Swiss fabric, "Tempex", developed to protect against extreme heat. (T10, Al)

329-T. Bell System Cable Sheath Problems and Designs. F. W. Horn and R. B. Ramsey. *Transactions of the American Institute of Electrical Engineers,* v. 70, pt. 2, 1951, p. 1811-1816.

A general discussion. Mechanical, electrical, and corrosion problems.
(T1, R3, Q general, P15)

330-T. Natural Draft and Forced Draft. (In French.) J. E. Lafon. *Métallurgie et la Construction Méchanique,* v. 84, Mar. 1952, p. 175, 177, 179, 181; Apr. 1952, p. 251, 253, 255.

Compares the two systems as applied to industrial furnaces, especially the regenerative type. Schematic diagrams illustrate principles.
(T5)

331-T. Participation of Aluminum in a Great French Undertaking; Dredges, Draglines, and Cableways of the Donzere-Mondragon. (In French.) Jean Reinhold and Jean Blanchot. *Revue de l'Aluminium,* v. 29, Apr. 1952, p. 137-149.

Use of Al alloys in construction of Rhone by-pass canal in above district. (T4, Al)

332-T. Light Alloy Surveyor's Transits. (In French.) Bernard Mallet. *Revue de l'Aluminium,* v. 29, Apr. 1952, p. 150-151.

Use of gravity or pressure die castings for various parts. (T8, Al)

333-T. Mobile Prerefrigeration Equipment of the S.T.E.F. (In French.) Maurice Victor. *Revue de l'Aluminium,* v. 29, Apr. 1952, p. 166-169.

Use of Al alloys in railroad-car-mounted equipment which applies preliminary refrigeration to cars for transportation of perishables.
(T23, Al)

334-T. Standardization of Heat Losses in Heating Systems. (In Russian.) E. P. Shubin and A. P. Safonov. *Za Ekonomiiu Topliva,* v. 9, Mar. 1952, p. 12-17.

A mathematical discussion. (T5)

335-T. Russian Tractors Show Sound Engineering. W. G. Patton. *Iron Age,* v. 169, June 5, 1952, p. 150-152. (Condensed from "Russ Packs Engineering Punch," J. M. Davies, *SAE Journal,* v. 60, June 1952, p. 17-21.

A report on Russian metalworking based on two captured Stalinetz 80 tractors. Heat treating, casting, and machining practices.
(T21, J general, E general, G17)

336-T. Aluminum Alloys in Civil Engineering Practice. Part 1. Introduction. S. K. Ghaswala. *Light Metal Age,* v. 10, Apr. 1952, p. 18-20, 22, 25.

A brief history and a description of general and architectural properties and uses. (To be continued.)
(T4, Al)

337-T. Developments in Francis Turbines. *Mechanical Engineering,* v. 74, June 1952, p. 510-512.

Discussion, including author's reply, of paper of similar title by W. J. Rheingans (Mar. 1952 issue). See item 169-T, 1952.
(T25, R2, SS, CN, Al)

338-T. Light-Alloy Lighters for Royal Pakistan Navy. *Sheet Metal Industries,* v. 29, June 1952, p. 525-526.
Small cargo carriers resembling landing craft. (T22, Al)

339-T. Use of Needle Tubing Extended to Mechanical Applications. *Materials & Methods,* v. 35, June 1952, p. 106-108.
Mechanical properties of Type 304 stainless steel hypodermic needle tubing, and a summary of new uses, both surgical and mechanical.
(T10, Q general, SS)

340-T. High Temperature Fastening Problem Solved With Special Self-Locking Nuts. Charles F. Faroni. *Materials & Methods,* v. 35, June 1952, p. 109-111.
How proper materials selection and new design resulted in fasteners that can withstand vibration at temperatures to 1200° F. On the basis of all-around performance, an 18-10 Cr-Ni stainless steel (Cb-stabilized and Se-modified) was selected. Tendency to "cold-weld" was overcome by use of Ag plate, which acts as a lubricant. Specific use is in a turbojet engine.
(T7, K13, SS, Ag)

341-T. Iron Powder Materials in High Frequency Transformers for Military Equipment. H. W. Lord. *Metal Powder Association,* "Proceedings, Seventh Annual Meeting", 1951, p. 22-28; disc., p. 28-29.
Properties and design of the transformers. Advantages of ferrite cores over iron-powder cores.
(T1, Fe)

342-T. Metal Powders in Some Small Arms Ammunition Applications. G. A. Miller, Jr. *Metal Powder Association,* "Proceedings, Seventh Annual Meeting", 1951, p. 30-38; disc., p. 38-40.
Experiments on use of powdered Fe in various projectiles, including small-calibre bullets, shells, armor-piercing cores, fuze parts, etc. Diagrams and illustrations.
(T2, H general, Fe)

343-T. Metal Powder Applications in the Home Appliance Field. J. D. Carey. *Metal Powder Association,* "Proceedings, Seventh Annual Meeting", 1951, p. 68-76; disc., p. 76-77.
An illustrated survey, with emphasis on G.E. appliances. (T10)

344-T. Type 430 Stainless for Roof Drainage. Richard E. Paret. *Sheet Metal Worker,* v. 43, June 1952, p. 37-38, 79, 82.
Reviews some installations of straight Cr stainless steel which have been in service for a number of years; and current installations in the residential field. Fabrication techniques in manufacture of stainless roof-drainage equipment.
(T26, G general, SS)

345-T. Radiant Oven Adapts to Job. *Steel,* v. 130, June 23, 1952, p. 77.
Radiant infrared oven panels for use in work which requires crowding heat in a limited space. Advantages. (T5)

346-T. Cleanliness Is Their Business. George Laycock. *Steelways,* v. 8, May 1952, p. 8-10.
The use of steel, especially stainless steel, in the soap-making industry. (T29, ST, SS)

347-T. (Czech.) **Alpha Beryllium Copper for Springs.** Ivan Cerkesov. *Hutnické Listy,* v. 7, Mar. 1952, p. 115-120; Apr. 1952, p. 186-190.
Production, fabrication, and mechanical properties. Tables and graphs. (T7, Cu, SG-b)

348-T. (French and German.) **The Development of Aluminum Windows in Switzerland.** M. Spescha. *Aluminium Suisse,* v. 2, May 1952, p. 75-79.
Manufacturing processes and various examples of use. (T26, Al)

349-T. (French and German.) **The Influence of the Use of Light Metals Upon Ship Construction and Assembly.** H. E. Jaeger. *Aluminium Suisse,* v. 2, May 1952, p. 80-90.
Difficulties presented by the use of light metals in construction. Selection of material from the point of view of corrosion resistance, the size necessary, and problems of assembly. Data are tabulated. 16 ref.
(T22, Al, Mg)

350-T. (French and German.) **"Fairmile" Aluminum Barges.** *Aluminium Suisse,* v. 2, May 1952, p. 92-93.
Manufactured by a British firm. Details of construction and advantages. Table contains comparative data on light metal and steel barges.
(T22, Al)

351-T. (French and German.) **Dam Guards of Aluminum.** *Aluminium Suisse,* v. 2, May 1952, p. 94-95.
On the Thames in England.
(T4, Al)

352-T. (French and German.) **Aluminum in Hospitals.** *Aluminium Suisse,* v. 2, May 1952, p. 100-101.
Varied applications. (T10, Al)

353-T. (French and German.) **Aluminum in Church Architecture.** *Aluminium Suisse,* v. 2, May 1952, p. 102-103.
Structural details of an Italian church tower made of Al, and

hoisted into place in one piece. (T26, Al)

354-T. (German.) **Aluminum Roof on the Westfalen Hall in Dortmund.** H. Kentzler and J. Schroeder. *Aluminium,* v. 28, Apr. 1952, p. 121-123. (T26, Al)

355-T. The Cost of Titanium-Alloy Advantages. *Aviation Week,* v. 56, June 30, 1952, p. 21-22, 24-26, 29, 32.

See abstract of "Titanium in Aero-Engine Construction", by H. H. Hanink, *Aeroplane;* item 273-T, 1952. (T24, Q general, Ti)

356-T. Permanent Magnets for Spectrographs and Nuclear Physical Research. D. Hadfield and D. L. Mawson. *British Journal of Applied Physics,* v. 3, June 1952, p. 199-202.

Some advantages of the permanent and electropermanent magnet over the electromagnet. Applications to various branches of particle research. Early and recent designs. Graphs and drawings. (T8, P16, SG-n)

357-T. Wider Design Opportunities With the New Phenolics. Part II. Alex E. Javitz. *Electrical Manufacturing,* v. 50, July 1952, p. 102-107, 264, 266, 268.

Laminate types are low-loss; Al and Cu clad; postformed; low-pressure; and alkali resistant. Properties and applications. Bonding of the metal-clad laminates. Tables and photographs. (To be continued.) (T1, K11, Al, Cu)

358-T. Electronic Components in Great Britain. *Electrical Manufacturing,* v. 50, July 1952, p. 118-120.

New developments including metal-film resistors, ferrites, semiconductors, and subminiaturization. Mentions a Au-Ag alloy film resistor built up on paper by photomechanical techniques and a Sn-Sb oxide film resistor. (T1, Au, Ag, Sn)

359-T. Recent French Developments in Lime-Ferritic Electrodes. *Foote Prints,* v. 24, No. 1, 1952, p. 19-22.

Information derived from a booklet published by Sarazin & Cie, one of the principal welding-electrode manufacturers in France. (T5)

360-T. What's Different About Cable Connectors for Aluminum Conductors? Francis A. Westbrook. *Industry and Power,* v. 63, July 1952, p. 91-92.

Expansion, hardness of material, corrosion, and size are all factors which may contribute to slow deterioration of the connection and cause future trouble. (T1, Al)

361-T. High-Temperature Alloys in Relation to Gas-Turbine Design. K. L. Buckle. *Institution of Mechanical Engineers, Proceedings,* sec. A, v. 166, No. 1, 1952, p. 123-30.

Discussion is limited to the combustion and expansion sections of the gas turbine. Significant mechanical properties of different high-temperature allovs, as well as ceramics. Examples of fatigue and creep failure. Fabrication characteristics and problems. Data are charted. (T25, Q general, SG-h)

362-T. Conservation of and/or Substitution for Critical Jet Engine Materials. N. E. Promisel. *Journal of Metals,* v. 4, July 1952, p. 698-702.

Major factors to be considered in determining the classification of a material as critical. Critical jet-engine materials; conservation; new basic materials; and other conservation approaches. (T25, SG-h)

363-T. Aluminum Goes to Sea—a New Era in Shipbuilding. Arthur Q. Smith. *Light Metal Age,* June 1952, p. 12-13. 33.

Extensive use of Al and alloys in the new S. S. United States. (T22, Al)

364-T. Aluminum Alloys in Civil Engineering Practice. Part 2. Prefabrication. S. K. Ghaswala. *Light Metal Age,* June 1952, p. 17, 27, 32.

Structural applications. Prefabrication methods. Comparison of mechanical properties with those of steel. Atmospheric and chemical corrosion resistance. (T4, Q general, R general, Al)

365-T. The Current Status of the Aluminum Auto Radiator. J. R. Holmes. *Modern Metals,* v. 8, June 1952, p. 33-34.

Major technical problems being encountered in the development of the Al radiator at Harrison Radiator Div., General Motors Corp., include high cost, welding and brazing difficulties, and others. (T21, K general, Al)

366-T. The Use of Aluminum Transmission Lines in Switzerland. R. Voegeli. *Modern Metals,* v. 8, June 1952, p. 36, 38.

Examples of use of Al conductors. Design considerations. Economic advantages of Al conductors for various voltages up to 380 kv. (T1, Al)

367-T. (English.) **Corrosion-Resistant Steels and Their Application as Liner Material in the Chemical Industry, and in the Petroleum Industry in Particular.** J. H. Van Swaal. *Metalen,* v. 7, Apr. 30, 1952, p. 137-143; May 31, 1952, p. 173-177.

Relative merits of different types of steels. Transformations, phase relationships, welding effects, heat treatment, embrittlement, and other properties. Part 2: Manufacture of clad steel by casting, fusion, arc

welding, spot welding, etc. Macrographs, diagrams, tables, and graphs.
(T29, L22, K general, SG-g, ST)

368-T. (French.) **The Manufacture and Maintenance of Steel Chains.** Louis Gascuel. *Métallurgie et la Construction mécanique,* v. 84, May 1952, p. 347, 349-351, 353.

Manufacturing processes for hand-wrought chains, the various welding processes, and the manufacture of rolled, nonwelded chains. A special process for the hardening of chains, and their care during use. Diagrams. (T7, G6, K general, J26, CN)

369-T. (French.) **The Problem of Heat Resistant Alloys in Automobile Construction.** H. Godfroid. *Métaux: Corrosion—Industries,* v. 27, Apr. 1952, p. 158-159.

The properties necessary for alloys used in automobile and airplane construction. Various alloys and their roles in specialized uses. (T21, SG-h)

370-T. (French.) **Problems in the Application of Refractory Materials in Reaction Motors.** R. Fleury. *Métaux: Corrosion—Industries,* v. 27, Apr. 1952, p. 160-163.

Reviews fundamental problems, such as the construction of turbine blades, turbine disks, necessary control tests, and thermal treatment. (T25, SG-h)

371-T. (German.) **Present Possibilities and Limitations in the Use of Light Metals in Shipbuilding.** E. Foerster. *Aluminium,* v. 28, June 1952, p. 177-181.

Technical and economic factors. The stability problem. (T22, Al, Mg)

372-T. (German.) **Recommendations for Selection and Processing of Aluminum Materials in Shipbuilding.** J. Reiprich. *Aluminium,* v. 28, June 1952, p. 181-183.

Includes table of ships of various countries, showing, for each, applications of Al and its alloys. (T22, Al)

373-T. (German.) **Aluminum Materials in Shipbuilding.** J. Reiprich. *Aluminium,* v. 28, June 1952, p. 184-186.

Comprehensive tabular presentation of Al alloy compositions, physical and mechanical properties. Alloy designations in the different countries. (T22, S22, Al)

374-T. (German.) **Light Metals in Italian Shipbuilding.** R. Struss. *Aluminium,* v. 28, June 1952, p. 187-190.

An illustrated survey. (T22, Al)

375-T. (German.) **Light-Metal Patrol Boats.** A. Pyszka. *Aluminium,* v. 28, June 1952, p. 195-198.

Entire body and superstructure of Rhine patrol boats are made of Al alloy. (T22, Al)

376-T. (German.) **Heat Insulation of Industrial Furnaces.** Ernst Maase. *Gas- und Wasserfach,* v. 93, June 1, 1952, p. 319-323.

Necessity of insulating gas furnaces in the same manner as electric furnaces. Simple methods for deducing the heat losses through the walls, and factors for determining it from diagrams. Data are tabulated. (T5)

377-T. (German.) **Zinc-Alloy Deep Drawing, Stamping, and Blanking Tools.** W. Wolf. *Metall,* v. 6, May 1952, p. 240-243.

Use of zinc alloys, particularly of "Z-430", for these tools. Advantages as compared to steel tools. Diagrams and micrographs.
(T5, G2, G3, G4, Zn, TS)

378-T. (Italian.) **Corrugated Aluminum Sheets for Roofing.** *Alluminio,* v. 21, May 1952, p. 179-199.

Advantages in the use of Al for roofs, such as light weight and corrosion resistance. Graphs and diagrams show details of construction and mechanical properties. Installation process. (T26, Al)

379-T. **Tips on Stainless for Aircraft Hydraulics.** J. B. Giacobbe. *Aviation Age,* v. 18, July 1952, p. 6-14.

Specifications for tolerances, mechanical properties, cleanliness, etc. Tips on alloy selection, flaring, bending, and burnishing.
(T24, L10, Q general, G6, SS)

380-T. **Let's Use Aluminum; Not Abuse It!** L. F. Hickernell and L. L. Carter. *Electrical World,* v. 138, July 14, 1952, p. 123-125.

Recommends that logical plan of selective usage be adopted to maintain existing standards of reliability and economics as electrical-supply systems undertake the conversion from Cu to Al. (T1, Al)

381-T. **All-Aluminum Use Climbs Cautiously.** *Electrical World,* v. 138, July 14, 1952, p. 126-128.

Survey shows widespread trial application of all-aluminum to distribution in small amounts, mostly for services. Graphs. (T1, Al)

382-T. **Boston Edison Installs First 15-Kv Aluminum Underground Cable.** *Electrical World,* v. 183, July 14, 1952, p. 133-136.
(T1, Al)

383-T. **New Aluminum-Body Truck.** *Food Engineering,* v. 24, July 1952, p. 90-91.

New lightweight Al-body trucks which are said to have structural and operational advantages.
(T21, Al)

384-T. Factors in Selecting Stainless Steels to Reduce Costs, Improve Performance, and Conserve Critical Alloying Elements. Basil T. Lanphier. *Machine Design,* v. 24, July 1952, p. 112-128.

Compares the distinguishing properties of many stainless steels as an aid to their evaluation for specific applications. Tables of properties and graphs. Photographs illustrate applications of various types.
(T general, Q general, P general, SS)

385-T. Trends in Gas Turbine Engine Materials. *Product Engineering,* v. 23, July 1952, p. 248, 250, 252, 254. (A Condensation.)

See abstract of "Gas Turbine Engine Materials", R. H. Thielemann, J. C. Mertz, and W. P. Eddy, Jr., *Machine Design;* item 168-T, 1952.
(T25, SG-h)

386-T. Aluminum Brazing Sheet Used in Radiator Studies. *Steel,* v. 131, July 7, 1952, p. 96-97.

New Al alloy brazing sheet developed by Alcoa which is expected to find immediate use in automotive radiator development. 3S alloy core has brazing alloy on one side, Alclad on the other. (T21, K8, Al)

387-T. Metal Film Resistors. R. J. Heritage. *Electronic Engineering,* v. 24, July 1952, p. 324-327.

Thin noble-metal films can be used to provide useful resistors of both the fixed and variable types which embody most of the properties expected of high-grade components. Electrical properties, available production methods, and limitations. Experimental fixed and variable resistors made from 60% Au, 40% Pt alloy on glass.
(T1, P15, Au, Pt)

388-T. Non-Ferrous Metals in Locomotives. J. D. Glen. *Metal Industry,* v. 80, June 27, 1952, p. 527-529.

Chief uses of nonferrous metals in the manufacture of locomotives.
(T23, EG-a)

389-T. (Book) **Materials Technology for Electron Tubes.** Walter H. Kohl. 493 pages. Chapman and Hall, Ltd., 37 Essex St., London W.C. 2, England. 80s net.

Sections of interest to metallurgists include those on: important metals; soldering and brazing; and ceramic-metal seals.
(T1, K7, K8, K11)

390-T. (Book) **Wire Ropes in Mines.** 828 pages. Institution of Mining and Metallurgy, Salisbury House, London, E.C. 2, England. $7.

Proceedings of conference held at Ashorne Hill, Leamington Spa, England in 1950. Text of 18 papers, report of the subsequent discussion, and summary of conclusions and recommendations. Metallurgical aspects include manufacturing, properties, and testing. (T28, G general)

391-T. Aluminum Connectors—the Manufacturer's Viewpoint. *Electric Light and Power,* v. 30, July 1952, p. 89-97.

Round-table comments from people who are expected to supply the fittings and accessories that will make the changeover to Al practicable. Various types illustrated.
(T1, Al)

392-T. How Gas Fuel Helped Make Aluminum for the World's Newest Ship. Arthur Q. Smith. *Industrial Gas,* v. 31, July 1952, p. 13-16, 27-28.

Furnace equipment and procedures for fabrication of miscellaneous Al items in *S. S. United States.*
(T22, Al)

393-T. Progress and Future of Structural Aluminium. C. Marsh. *Light Metals,* v. 15, July 1952, p. 219-220.

A brief survey, with special reference to Swiss conditions. (T26, Al)

394-T. Aluminium in Paper Making Plant. *Light Metals,* v. 15, July 1952, p. 238. (Translated from *Revue de l'Aluminium).*
(T29, Al)

395-T. Corrugated Aluminium for General Building in Israel. *Light Metals,* v. 15, July 1952, p. 244-245.
(T26, Al)

396-T. Gear Manufacturers Hold Thirty-Sixth Annual Meeting. *Machinery* (American), v. 58, July 1952, p. 212-213.

Brief report, including notes on production, molding practice, and mechanical properties of ductile iron.
(T7, Ti)

397-T. How Atomic Radiation Affects Engineering Materials. D. O. Lesser, *Materials & Methods,* v. 36, July 1952, p. 75-78.

Need for consideration not only of conventional properties but also atomic-radiation affects when choosing engineering materials for equipment in atomic power plants and reactors. Simplified theory, experimental techniques, reactor problems, and effects on oils, elastomers, ceramics, plastics, and metals.
(T25, P13)

398-T. Aluminium Roofing Technique. *Metal Industry,* v. 81, July 11, 1952, p. 26.

Construction of a palace roof, employing the Aygee patent system of

curtain walling to provide a roof of Al sheet and glass. (T26, Al)

399-T. Engineering Principles and Metal Requirements for Atomic Power Plants. W. J. Koshuba and V. P. Calkins. *Metal Progress,* v. 62, July 1952, p. 97-114.

Review of nuclear energy concepts; methods of heat utilization; heat-transfer media including molten metals; kinds of reactors; primary and secondary reactor fuels; reactors in operation or under construction; reactor operation and control; construction materials for reactors; extractive metallurgy of uranium; shielding materials; and radio toxicology. (T25, P13, U)

400-T. Furnace Flames and Efficiency. *Metal Progress,* v. 62, July 1952, p. 154, 156. (Condensed from "Flame Radiation and Furnace Efficiency", Max Davies.)

Previously abstracted from *Murex Limited Review.* See item 252-T, 1952. (T5)

401-T. A Completely Insulated Aluminum Window. *Modern Metals,* v. 8, July 1952, p. 25-26.

Al window and another product, a new prefabricated Al curtain wall panel—both made by Kesko Products, Bristol, Ind. (T26, Al)

402-T. Interview With an Aluminum Building Product Manufacturer. *Modern Metals,* v. 8, July 1952, p. 28-30, 32.

Interview with the Sales Manager of Nichols Wire & Aluminum Co., Davenport, Iowa, covering the future of Al products, the company's present activities, and sales and economic aspects. (T26, Al)

403-T. Aluminum in the Petroleum Industry. *Modern Metals,* v. 8, July 1952, p. 34-36.

Al for such applications as river and bridge crossings, underground lines, sucker rods, exploratory rigs, heat exchangers, and instrument lines. (T28, T29, Al)

404-T. The New Queen of the Seas —S. S. United States. *Modern Metals,* v. 8, July 1952, p. 42-45.

Applications of Al. A new method was employed in driving rivets. They were first heat treated and then placed in cold storage to retard age hardening. (T22, K13, Al)

405-T. The Glass-Aluminum Jalousie. *Modern Metals,* v. 8, July 1952, p. 47-49.

The background of the jalousie (modernization of old-fashioned roller blind), and how it is made. (T10, Al)

406-T. Magnesium in Canada. Yesterday — Today — Tomorrow. *Modern Metals,* v. 8, July 1952, p. 50-51.

History and outlook and a list of Mg applications. (T general, A2, Mg)

407-T. For Automobile Radiators: a New Aluminum Brazing Sheet. *Modern Metals,* v. 8, July 1952, p. 52, 54.

Developed by Aluminum Co. of America, No. XA30 brazing sheet is a composite of three alloys—a 3S alloy core is coated on one side with a low-melting-point brazing alloy, and on the other side with a corrosion resistant Alclad alloy. Solution of the corrosion problem. Diagram. (T21, R4, Al)

408-T. Have You Tried Aluminum in Your Refinery? Ellis D. Verink, Jr. *Petroleum Refiner,* v. 31, July 1952, p. 141-144.

Uses of Al in the petroleum industry. Chemicals which have been handled and processed in Al equipment. Table and photographs. 13 ref. (T29, Al)

409-T. New Developments in the Auto-Sembly Technique of Circuit Fabrication. S. F. Danko. *Proceedings of the National Electronics Conference,* v. 7, 1951, p. 542-550.

The auto-sembly technique of circuit fabrication is based on use of prefabricted conductor patterns of copper on an insulating plastic base, conventional components, and solder dip assembly of components to pattern. Various applications of these techniques. Copper-faced laminate materials are suited for temperatures up to 200° C. Patterns of aluminum, iron, bronze, and silver can also be prepared for special applications. Variations in the technique of solder-dipping in the preparation of embossed, sub-surfaced, and flush patterns, and in packaging of auto-sembled patterns. (T1, K7, Cu, Al, Fe, Ag)

410-T. Copper Dome and Gutters on UN Building. *Sheet Metal Worker,* v. 43, July 1952, p. 45-46, 80.

Unusual design features of the dome and gutter construction on the UN General Assembly Building, New York City. Pb-coated Cu sheets were sheared to proper taper for the dome and the gutters were reinforced with stiffeners attached with explosive rivets. (T26, Cu)

411-T. (French.) Brightly Polished B. B. T. Oval Aluminum Reflectors for Public Lighting. G. Montchatre. *Revue de l'Aluminium,* v. 29, June 1952, p. 230-231.

The reflectors are prepared by electrolytic brightening and anodic oxidation. After 2½ years exposure to marine atmospheres, no damage occurred. (T10, R4, Al)

412-T. (French.) Design for Vitral Fixtures. Maurice Victor. *Revue de*

l'Aluminium, v. 29, June 1952, p. 240-243.

Al-alloy shop-window fixtures include internal and external parts assembled by use of wedges and bolts. Diagrammed and illustrated. (T10, Al)

413-T. (French.) **Five Tons of Magnesium in the B-36 Structure.** André Chevrier. *Revue de l'Aluminium,* v. 29, June 1952, p. 244-248.

U. S. plane which incorporates about 5 tons of Mg in the form of rolled products or castings and forgings. (T24, Mg)

414-T. (German.) **Economic Limits to the Use of Cast Aluminum in Automobile Construction.** K. Schneider. *Giesserei,* v. 39, June 2, 1952, p. 309-311.

Compares costs for various parts in cast iron and aluminum. Technical considerations, such as weight of the vehicle, gasoline consumption, and various advantages of aluminum as compared to gray iron. Tables contain comparisons of costs and weights. (T21, Al)

415-T. (German.) **Cable Lead.** H. Boesche. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 5, June 1952, p. 217-219.

Damage to cables as the result of excessive oxidation, intercrystalline fractures, and coarse grain formation. Necessity of standardizing lead alloys used in cables. Graphs. (T7, Q26, R2, Pb)

416-T. S. S. United States. *Architectural Forum.* v. 97, July 1952, p. 119-125.

New architectural features, including extensive use of Al and its alloys. (T22, Al)

417-T. Faceted Metal Wall for Alcoa in Pittsburgh Sets New Style in Tall Buildings. *Architectural Forum,* v. 97, July 1952, p. 134-135.

First tall office building ever erected with all-aluminum skin. (T26, Al)

418-T. New Beds for Rivers of Molten Metal. *Inco Magazine,* v. 25, no. 3, 1952, p. 9.

Ductile-iron troughs resist attack of molten Al much better than the gray iron previously used to transfer the metal from holding ladles to multiple casting units. (T5, R6, CI)

419-T. A Comparison of Twist Drills Manufactured From Standard and Special High-Speed Steels; Effect of Various Methods of Flute Preparation. P. Spear, I. R. Robinson, and K. J. B. Wolfe. *Metal Treatment and Drop Forging,* v. 19, July 1952, p. 293-301.

Twist drills 1/8 in. diam. manufactured from the standard 18-4-1 high speed steel were compared with those of the same diameter made from three high speed steels of lower tungsten content. Results are charted and tabulated. Data were subjected to statistical examination. Includes X-ray diffraction patterns and micrographs. 10 ref. (T6, G17, Q general, M27, TS)

420-T. Tools for Clipping Drop Forgings. *Metal Treatment and Drop Forging,* v. 19, July 1952, p. 313-318.

A subcommittee, set up by the National Association of Drop Forgers and Stampers, has investigated current practices in design and composition of steels used in the construction of tools for removing flash from drop forgings. Diagrams and tables give compositions, hardness ranges and heat treatments. Suitable toolsteels and hard-surfacing alloys. (T5, F22, TS, SG-j)

421-T. Manganese Steels Lengthen Rail Life. David P. Carr. *Overseas Engineer,* v. 26, Aug. 1952, p. 12-13.

Throughout the world increasing use is being made of high-Mn steel for switches and crossings. (T23, AY)

422-T. Stainless Inserts Aid Furnace Design. *Steel,* v. 131, Aug. 4, 1952, p. 102.

Improved product design and solution of a serious maintenance problem in induction furnaces for foundry, die casting, and similar applications are benefits being realized at Ajax Engineering Co., Trenton, N. J. Heli-Coil thread inserts made of stainless steel wire prevent seizure of bolts at high temperatures. (T5, SS)

423-T. Ryan Alloy for Exhaust Systems Resists Scaling at 1800° Temperatures. Henry Berlinghof, Jr. *Western Metals,* v. 10, July 1952, p. 42-43.

Development of "Rynalloy" to insure the proper functioning of the ball-and-socket joints in Army personnel carriers. Composition is not given. These assemblies are used to provide flexible exhaust-gas connections between the power plant and the chassis. (T7, SG-h)

424-T. (French.) **Structures of Reinforced Concrete, or of Metal?** J. Verdeyen. *L'Ossature Métallique,* v. 17, July-Aug., 1952, p. 385-390.

Relative merits of both types of structures. Advantages of both for specialized tasks of their own. (T26)

425-T. (German.) **Observations on the Danger of Ignition of Firedamp by Metallic Sparks Produced by Friction or by Impact.** L. Weichsel. *Aluminium,* v. 28, July-Aug. 1952, p. 251-253.

The danger is eliminated by use of Al for parts of mine equipment which often come in frictional or

impact contact. Sparks are not produced by friction or impact of Al. (T28, Q9, Al)

426-T. Applications of Copper-Clad Aluminum. *Metallurgia,* v. 46, July 1952, p. 39-40.

Available forms and applications of German product named "Cupal". (T general, Cu, Al)

427-T. Portable Electronic Equipment Improved With Magnesium Die Castings. Brone M. Walunas. *Precision Metal Molding,* v. 10, Aug. 1952, p. 27-28.

Successor to "Walkie-Talkie" manufactured by Raytheon Mfg. Co., Boston. (T1, Mg)

428-T. Die Castings Mount and Protect Gear Mechanisms. *Precision Metal Molding,* v. 10, Aug. 1952, p. 44-46.

Al parts for cameras and tripods made by Akeley Camera and Instrument Corp., New York. (T9, Al)

429-T. Three Copper Alloys Used in Permanent Mold Casting and Die Castings. *Precision Metal Molding,* v. 10, Aug. 1952, p. 47-48, 78-80.

Use in garbage-disposal units. They include a 60-40 brass permanent-mold casting, an Al-bronze permanent-mold casting, a 60-40 brass die casting, and a Si bronze die casting. (T10, Cu)

430-T. Characteristics of Nickel-Cadmium Batteries Produced by Powder Metallurgy. C. Berg. *Precision Metal Molding,* v. 10, Aug. 1952, p. 49-50, 83-84.

Pocket-type Ni-Cd cells produced at Easthampton, Mass. Plant of Nickel Cadmium Battery Corp. use sintered carbonyl-Ni plates. Method of production and advantages, especially greater porosity. (T1, H general, Ni)

431-T. Titanium: Expensive Weight Saver. *SAE Journal,* v. 60, Aug. 1952, p. 25-30. (Based on "Application of Titanium to Aircraft Engines", by H. H. Hanink.)

Comparative mechanical-property data for Ti and other metals. Relative merits for different jet and piston-engine applications. Higher costs are balanced against weight savings for Ti and its alloys. Mechanical-property limitations and advantages are discussed. (T24, Q general, Ti)

432-T. Equipment and Procedure for Service Renewals With Soft Copper Tube. I. S. Webster. *American Gas Association, Proceedings,* v. 33, 1951, p. 361-379.

Experiences in replacing old utilities pipe with copper tube. Compares cost with use of unwrapped steel pipe. Diagram and photographs. (T4, Cu, ST)

433-T. Aluminum Decals Require no Fasteners. *Automotive Industries,* v. 107, Aug. 15, 1952, p. 39.

Metal decal to carry operating instructions, trade marks, and firm names on automotive and aircraft equipment. (T10, Al)

434-T. Selection and Treatment of Die Steels. Stewart G. Fletcher. *Better Enameling,* v. 23, Aug. 1952, p. 17-19, 22-23, 26-29.

Previously abstracted from *Tool Engineer.* See item 217-T, 1952. (T5, Q general, CN)

435-T. Aluminium Motor Yacht "Tonquin". *Engineering,* v. 174, Aug. 8, 1952, p. 188-189.

A 14-ton all-aluminum vessel. (T22, Al)

436-T. Porcelain-Enamel Panels Introduced for Tunnel Hung-Ceiling Construction. T. O. Blashke. *Engineering News-Record,* v. 149, Aug. 21, 1952, p. 37-38.

Innovation in the Elizabeth River Tunnel between Portsmouth and South Norfolk, Va. (T4, CN)

437-T. Building Walls of Stainless Steel. *Iron Age,* v. 170, Aug. 21, 1952, p. 65.

Construction of walls for Equitable Life Insurance buildings in Pittsburgh. (T26, SS)

438-T. Magnesium Acceptance Growing. R. D. Raddant. *Iron Age,* v. 170, Aug. 21, 1952, p. 74, 77.

Increasing tendency toward use of Mg and alloys in automobile industry. (T21, Mg)

439-T. Industrial Blades and Knives. *Iron & Steel,* v. 25, Aug. 1952, p. 358, 377.

French facilities for manufacture, including manufacture of the steel and its heat treatment; and machining and grinding processes. (T6, D general, G17, J general, ST)

440-T. New Aluminum Brazing Sheet. *Light Metal Age,* v. 10, Aug. 1952, p. 14-15.

New brazing sheet has a core metal of 38 alloy. One side of the core metal is clad with C43S brazing alloy to assure good joints, and the other side has an Alclad coating which offers electrolytic protection to the core. It was developed particularly for use in auto-radiator fabrication. Diagrams and macrographs. (T5, K8, Al)

441-T. Magnesium in the 1952 Automobiles. *Magazine of Magnesium,* Aug. 1952, p. 1-3.

Applications in 1952 Chrysler cars for 16 die and permanent-mold cast parts. (T21, Mg)

442-T. Magnesium Plays Important Part in Chance Vought Planes. *Maga-*

zine of Magnesium, Aug. 1952, p. 8-11. (T24, Mg)

443-T. Gasket Materials — Their Properties and Uses. Sidney G. Kelley, Jr. *Materials & Methods,* v. 36, Aug. 1952, p. 108-112.

Deals with various types including metals. (T7)

444-T. New Roof for Alexandra Palace; Aluminium Solves Some Difficult Problems. *Sheet Metal Industries,* v. 29, Aug. 1952, p. 737-738. (T26, Al)

445-T. Pittsburgh's Dressing Up With Stainless. *Steel Horizons,* v. 14, Summer 1952, p. 3-5.

See abstract of "Building Walls of Stainless Steel", *Iron Age;* item 437-T, 1952. (T26, SS)

446-T. Purity's Here To Stay. *Steel Horizons,* v. 14, Summer 1952, p. 8-9.

Uses of stainless steel in the ice-cream plant. (T29, SS)

447-T. Hardest Alloy Whips Abrasion. *Steel Horizons,* v. 14, Summer 1952, p. 18-19.

Use of carbide-tipped pulverizing hammers in equipment for grinding a very abrasive clay. Wear resistance is so high that hammer life is increased 900-1000%. (T28, Q9, C-n)

448-T. Physics and Furnaces. M. W. Thring. *Times Science Review,* Autumn 1952, p. 4, 7.

Reviews work of BISRA on development of optimum industrial furnace design by use of models. (T5)

449-T. Cast Magnesium Wing Section Produced. *Western Machinery and Steel World,* v. 43, Aug. 1952, p. 85.

It is believed that cast wings can be produced much more rapidly and economically than conventional aircraft wings; Mg, produced from sea water, is inexhaustible. (T24, E general, Mg)

450-T. New Twist on an Old Cutter. *Western Machinery and Steel World,* v. 43, Aug. 1952, p. 102-103.

Boeing speeds production by developing a helical carbide cutter which cuts metal faster and greatly reduces time required for machining. The cutter is made by using a mechanical bender-twister to work inside the turns of an electronic induction-heater coil. (T6, G17, C-n)

451-T. (English.) **Steels for Ball Bearings.** *Aciers fins et spéciaux Francais,* June 1952, p. 52-53.

Compositions, manufacture, melting, heat treatment, inspection, and testing. (T7, AY, SG-c)

452-T. (English.) **Special Steels in the Clock and Watch Making Industry.** *Aciers fins et spéciaux Francais,* June 1952, p. 64-66.

Composition, specifications, and properties. (T9, S22, AY)

453-T. (English.) **Manufacture of Bolts, Nuts and Screws of Stainless Steel.** *Aciers fins et spéciaux Francais,* June 1952, p. 79-81.

Compositions, fabrication procedures, and mechanical properties. (T7, G10, Q general, SS)

454-T. (English.) **Modern Die Blocks.** *Aciers fins et spéciaux Francais,* June 1952, p. 88-90.

Compositions and mechanical properties of steels for forging, pressing, and stamping operations. (T5, Q general, TS)

455-T. Aluminum Challenges Copper. *Architectural Forum,* v. 97, Aug. 1952, p. 140-146.

Application of Al for wiring, panel cooling, and water piping. Photographs and diagrams. (T1, T26, Al)

456-T. Facel-Métallon Bodywork: French Methods for Coachwork in Light Alloy, Steel, or Combinations of the Two Materials. A. G. Douglas Clease. *Automobile Engineer,* v. 42, Aug. 1952, p. 310-315.

System can be used for mass production or for fabrication of one body. Diagrams and photographs. (T21, ST)

457-T. Packard Marine Diesel Engines Feature Aluminum Construction and Interchangeability of Parts. Joseph Geschelin. *Automotive Industries,* v. 107, Sept. 1, 1952, p. 40-44, 80.

Basic specifications. Diagrams and photographs. (T22, Al)

458-T. Fageol Aluminum Engine Designed for Military Use. *Automotive Industries,* v. 107, Sept. 1, 1952, p. 45, 82.

Includes use of stainless steel thread inserts. (T2, Al, SS)

459-T. Magnesium: Neglected Plane Material. H. Spencer Peterson. *Aviation Week,* v. 57, Sept. 1, 1952, p. 21-23, 25-27.

Advantages for use in primary structures. Bureau of Aeronautics research program on problems involved. Mechanical properties and corrosion preventive coatings. (T24, Q general, L general, Mg)

460-T. Magnesium in Aircraft. R. Smallman-Tew. *Canadian Metals,* v. 15, June 1952, p. 22, 24; July 1952, p. 24, 26.

See abstract of "Why Magnesium in Aircraft Construction?" *Modern Metals,* item 85-T, 1952. (T24, Mg)

461-T. All-Metal Containers Replace Wooden Ones for Aircraft Engines. *Corrosion* (News Section), v. 8, Sept. 1952, p. 1. (Reprinted from *Technical Data Digest,* Sept. 1951, p. 12.) (T24, CN)

462-T. Major Improvement in Rectifiers Is Claimed for New Titanium Dioxide Unit. *Corrosion* (News Section), v. 8, Sept. 1952, p. 14, 16. (Based on report of R. G. Breckenridge and W. R. Hosler.)

New type rectifier recently developed by the National Bureau of Standards is composed of a layer of semiconducting TiO_2, a sheet of Ti metal, and a counterelectrode of some other conducting metal. (T1, Ti)

463-T. Structural Design and Design for Extrusions. D. A. Beck. *Engineer Research and Development Laboratories* (Ft. Belvoir, Va.), "The Magnesium Symposium", Feb. 9, 1951, p. 11-19.

Design as applied to Mg and its alloys. Suitability of the various alloys for different uses. (T general, G5, Mg)

464-T. Aluminum Vs. Copper in Your Electrical System. Joe St. Andre. *Factory Management and Maintenance,* v. 110, Sept. 1952, p. 132-134.

Information condensed in chart form. (T1, Al, Cu)

465-T. Packaging With Aluminum Foil—How, When, Where to Use It. W. J. Faymonville. *Flow,* v. 7, Sept. 1952, p. 113-120, 122, 124, 126-129.

A reference guide. Diagrams, graphs, and illustrations. (T10, Al)

466-T. Self-Baking Electrodes Spur Development of Bigger, Better Furnaces. M. O. Sem. *Iron Age,* v. 170, Aug. 28, 1952, p. 95-99.

Larger, simpler, and improved electric furnaces which have resulted in Europe from reliable operation of continuous, self-baking electrodes. Mechanically charged open smelting furnaces have been designed with swingable, charging chutes in capacities to 30,000 kw. Covered furnaces permit collection of waste gases for further use in the plant, in some cases for burning limestone. The rotating-hearth furnace has proved its worth in production operations. Savings in both coke and limestone have been reported for an 18,000-20,000-kw. unit installed in Sweden. Lower electrode consumption and cleaner operation are claimed. Diagrams and illustrations. (C21, D5)

467-T. Fabricated Castings and Plate Make Lighter Pumps. Ray Zeh. *Iron Age,* v. 170, Aug. 28, 1952, p. 100-101.

Change in petroleum slush-pump design from casting to a weldment composed of castings and steel plate. This reduced over-all weight by nearly 4000 lb. (T28, K general, CI, CN)

468-T. New Bearing Made of Any Material, Lubricated With Any Fluid. R. M. Higgins. *Iron Age,* v. 170, Sept. 11, 1952, p. 158-160.

Description of a fluid-piston type bearing developed by Allis-Chalmers Mfg. Co. Diagrams. (T7, SG-c)

469-T. Selection of Steel for Automobile Parts. A. L. Boegehold. *Metal Progress,* v. 62, Sept. 1952, p. 67-71.

The hardenability aspect. Graphs show cross-sectional hardness and strength of axles after heat treatment, compared with theoretical stress distribution; and results of torsion and fatigue tests on 11 carbon or alloy steels. Schematic relationship of end-quench hardenability test to cooling transformation diagram for SAE 8630 steel. (T21, J26, Q general, AY, CN)

470-T. New Aluminum Minesweepers for the Canadian Navy. *Modern Metals,* v. 8, Aug. 1952, p. 28-29.

Fabrication problems and the advantages in using Al for shipbuilding purposes. (T22, Al)

471-T. Light Metals in the Cummins Diesel Racing Car. *Modern Metals,* v. 8, Aug. 1952, p. 30, 32.

Some features of the car, which makes extensive use of Al and Mg. (T21, Al, Mg)

472-T. The Use of Aluminum in Insulated Power Conductors. E. E. McIlveen. *Modern Metals,* v. 8, Aug. 1952, p. 33-34, 36.

Use of Al vs. Cu from an economic and technical standpoint rather than from the availability point of view. (T1, Al, Cu)

473-T. An Almost Invisible Aluminum Storm Window. *Modern Metals,* v. 8, Aug. 1952, p. 37-38.

Al storm windows that do not have an outer subframe. (T26, Al)

474-T. Radiant Glassheat; Clean—Healthful—Economical. *Modern Metals,* v. 8, Aug. 1952, p. 54-55.

Continental Radiant Glass Heating Corp. of New York, has brought out simplified heating system which employs electrically heated glass panels. Attached to the wall, and requiring no piping or ductwork, the panels are backed by a sheet Al reflector tray that radiates the heat into the room. Heat is provided by a sprayed-on Al grid. (T27, Al)

475-T. Remodeling Buildings With Aluminum. *Modern Metals,* v. 8, Aug. 1952, p. 57-59.

Al is playing a major role in the remodeling boom now under way. A few of the many applications in this field. (T26, Al)

476-T. A Triple-Duty Office Ceiling. *Modern Metals,* v. 8, Aug. 1952, p. 60.

Perforated Al panels provide radiant heating and cooling plus acoustical control. (T26, Al)

477-T. Preparation of Zinc Sheets for the Engraver. A. G. Arend. *Process Engravers' Monthly,* v. 58, Aug. 1951, p. 234.

Casting, rolling, grinding, polishing, and inspection.
(T9, C5, F23, L10, S13, Zn)

478-T. Copper Plates for Engraving. F. J. Brislee. *Process Engravers' Monthly,* v. 58, Nov. 1951, p. 329-330.

Smelting, refining, and casting.
(T9, C21, C5, Cu)

479-T. Dozer Design Departs From Standard. *Steel,* v. 131, Sept. 8, 1952, p. 96, 99.

The Baker bulldozer, an all-welded construction which saves 1150 lb. of steel per unit. (T4, K1, CN)

480-T. Tramway to the Clouds. Harriet Geithmann. *Welding Engineer,* v. 37, Sept. 1952, p. 44-46.

General description of the tramway at Mt. Hood. Welded construction. (T23, K general, CN)

481-T. Wire for Pre-Stressed Concrete. B. M. Pearson. *Wire Industry,* v. 19, Aug. 1952, p. 737-738, 741-742, 761.

Requirements for materials used in the stressing, including technical advantages of prestressed concrete, metallurgical requirements of steel used, wire-rope elongation, minimum bend radius, end anchorages, relaxing in the rope heads, and use of a concrete casting. (T26, Q23, CN)

482-T. The Development of Steels for the Construction of Steam Boilers in Germany. Karl Kreitz. 4th International Mechanical Engineering Congress, June 1952, 24 pages.

General survey over the last 20 years. Tabular data on composition and mechanical properties of typical alloyed and unalloyed steels for the different periods for boiler and superheater tubes, saturated and superheated steam-collecting mains, boiler plates and drums, and for screws. 11 ref.
(T26, Q general, CN, AY)

483-T. Gears for Traction Motors. C. Thielers and S. G. Klemming. 4th International Mehcanical Engineering Congress, June 1952, 9 pages.

Selection, machining, and heat treatment of steels for gears. Diagrams and graphs.
(T7, G17, J general, CN, AY)

484-T. Self-Lubricating Bearings—Their Properties and Applications. K. G. Thafvelin. 4th International Mechanical Engineering Congress, June 1952, 20 pages.

Theory of bearings; experimental data on bronze bearings; friction data; permissible load; heat expansion; choice of material, oil, and shafts; assembly; and suitable applications. Photographs, graphs, and equipment and other diagrams.
(T7, Q9, Cu, SG-c)

485-T. Duralumin Wire for Riveted Joints. H. Kalpers. *Draht* (Wire) (English Ed.), July 1952, p. 43.

Brief discussion. Miscellaneous properties are summarized. (T7, Al)

486-T. (French and German.) **Light-Metal Aqueduct at the Borgne Power Plant.** R. Zimmerman. *Aluminium Suisse,* v. 2, July 1952, p. 112-114.

Construction and installation in Switzerland. Advantages over reinforced concrete. (T4, Al)

487-T. (French and German.) **Aluman Roofing in Switzerland.** E. Müller. *Aluminium Suisse,* v. 2, July 1952, p. 126-131.

Excellent condition of old Al roofs. Technique and application of Al and Al-Mn alloys for roofing of all types. Photographs. (T26, R3, Al)

488-T. (French and German.) **Dining Hall for a Research Institute.** *Aluminium Suisse,* v. 2, July 1952, p. 137.

Extensive application of Al in the construction and furniture of the dining hall of the Fulmer Research Institute near London. (T26, Al)

489-T. (French and German.) **Aluminum Facades.** *Aluminium Suisse,* v. 2, July 1952, p. 138-139.

Application in buildings in Switzerland. (T26, Al)

490-T. (French.) **Applications of New Materials and Technological Processes in Typewriter and Calculator Production.** O. Maritano. 4th International Mechanical Engineering Congress, June 1952, 14 pages.

Materials used and their advantages. Problems needing solution. Materials mentioned are cast iron, light alloys, free-cutting steels, cold rolled steels, sintered iron, and plastics. Processes are die casting of cast iron and light alloys, magnetic inspection of steel bars, copper brazing, and powder metallurgy.
(T10, CI, ST, Fe, Cu, SG-k)

491-T. (French.) **Modern Requirements of Alloy Steels for the Manufacture of Antifriction Bearings.** Dauide Giaccone. 4th International Mechanical Engineering Congress, June 1952, 15 pages.

Defects encountered in Cr steel for ball and roller bearings which constitute an obstacle to completion of the manufacturing processes involved. Impurities and lamination defects. Photomicrographs.
(T7, M27, AY, SG-c)

492-T. (German.) **The Development of Gray Cast Iron as a Constructional Material.** E. Piwowarsky. 4th International Mechanical Engineering Congress, June 1952, 8 pages.

Advantages, mechanical properties, constructional features, and applications. (T26, Q general, CI)

493-T. Alloy Plate Mounts. John Stephenson. *British Printer,* v. 65, July-Aug. 1952, p. 60-61, 66.

A printing plate mount having a honeycomb duraluminum base. (T9. Al)

494-T. (German.) **Characterization of Coated Electrodes.** Werner Hummitzsch. *Schweisstechnik,* v. 6, May 1952, p. 49-57.

Evaluates different types of electrodes and their performance, in particular the craters of various coated electrodes, transfer of droplets in the electric arc, electrical resistance of electrode coatings and electrical conductivity of their hot slags, viscosity and surface tension of the slags, and form and structure of the weldments. Diagrams and photographs. (T5, K1)

495-T. Aluminium-Alloy Barges for the Congo. *Engineering,* v. 174, Aug. 29, 1952, p. 269.

Brief description. Includes dimensions and photographs. (T22, Al)

496-T. The Rolling of Metals. *Machinery Lloyd* (Overseas Ed.), v. 24, Aug. 30, 1952, p. 93, 95-97.

British plant, Midland Rollmakers, Ltd., and some of the rolls manufactured. (T5, ST)

497-T. Selecting the Right Journal Bearing Material. E. H. Scott, Jr., and E. R. Booser. *Product Engineering,* v. 23, Sept. 1952, p. 119-126.

Analysis of commonly used journal bearing materials with respect to compatability, embeddability, corrosion resistance, fatigue strength, cost, and availability. 10 ref. (T7, Q general, R general, SG-c)

498-T. Designers Find New Ways to Use Aluminum. *Product Engineering,* v. 23, Sept. 1952, p. 197-201.

First all-metal, single-place, lightweight airplane (Beechcraft Associates, Inc., San Diego, Calif.); and first all-aluminum, 60-ft. ship (Grimston Astor Ltd., England). (T24, T22, Al)

499-T. Aluminium for Cables. Karl-Heinz Hahne. 4th International Mechanical Engineering Congress, June 1952, 15 pages.

Manufacture of Al cables, with emphasis on the method of applying Al sheaths. Details for the latter, especially for the Balgen sheath. Use of outer plastic coating for corrosion prevention. Diagrams, photographs, table, and graph. (T1, L26, Al)

500-T. Application of Plastics Together With Metals. Richard Vieweg. 4th International Mechanical Engineering Congress, June 1952, 8 pages.

Application-interrelations of metals and plastics especially in regard to development and outlook for the plastics industry. Classification of plastics and comparison of properties of metals, plastics, and glasses. (T general. Q general)

501-T. Progress in the Realm of Materials for Technical Uses. R. Mossoux. 4th International Mechanical Engineering Congress, June 1952, 9 pages.

General discussion pertaining to raw materials and to ordinary construction steels. (T general, ST)

502-T. (French.) **Different Applications of Alloy Steels for Jet Engines.** Giancarlo Anselmetti. 4th International Mechanical Engineering Congress, June 1952, 9 pages.

Types of application, depending upon the temperature to which the alloys are exposed: weakly alloyed (pearlitic) mild steels for turbine disks, austenitic steels for jet engine accessories exposed to temperatures above 550° C, and special alloys, such as the "Nimonics" for turbine blades. Tables show the composition of pearlitic steels, their mechanical properties at room temperature, coefficient of expansion, and specific gravity at elevated temperatures. (T25, Q general, P10, P11, AY, Ni, SG-h)

503-T. (French.) **Prouvé School Buildings.** Maurice Victor. *Revue de l'Aluminium,* v. 29, July-Aug. 1952, p. 267-279.

Diagrams and illustrations show construction of prefabricated school buildings which make extensive use of Al alloys. They are made by the French firms Jean Prouvé and Société Studal and are extremely modernistic. (T26, Al)

504-T. (French.) **Light-Alloy Flooring of the Bascule Bridge at Havre.** Jean Reinhold. *Revue de l'Aluminium,* v. 29, July-Aug. 1952, p. 285-290.

Use of extruded Al-alloy sections with a bituminous coating as a replacement for the wood used before the war. Weight is only 44% of that of conventional flooring. (T26, Al)

505-T. (French.) **"Franklin D. Roosevelt"—a Subway Station in Aluminum.** Maurice Victor. *Revue de l'Aluminium,* v. 29, July-Aug. 1952, p. 291-294.

Use of Al-alloy decorative struc-

ture for display window framing in Paris subway station. (T26, Al)

506-T. (German.) **Light-Weight Steel Design in High-Duty Service Tower Construction.** Erich Bahke. 4th International Mechanical Engineering Congress, June 1952, 11 pages.

Design changes which become necessary when using light steels, and which led to the development of a new style in this type of construction. (T26, ST)

507-T. (German.) **Materials of Construction for Distilleries.** Dietmar Plöttner. *Werkstoffe und Korrosion,* v. 3, Aug. 1952, p. 293-294.

Relative merits of various metallic and nonmetallic materials, including protective coatings, not only for corrosion resistance but for prevention of taste changes in the liquors processed or stored. (T29, R7, L general)

508-T. (Book.) **Data Book for Civil Engineers. Vol. I. Design. Ed. 2.** Elwyn E. Seelye. 521 pages. 1951. John Wiley and Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $10.00.

Prime purpose is to furnish the engineer with sufficient data for designing any civil engineering work without other reference books. Included are structural data on concrete, steel and Al, and welding and one page on metal corrosion. Present edition has been brought up to date, and expanded. (T26, T4, Q general, ST, Al)

509-T. Booming Market in Steel Windows. *American Lumberman & Building Products Merchandiser,* Sept. 8, 1952, p. 206-207.

"Package window" units. New developments in this field indicate profitable sales. (T26, ST)

510-T. New Material Forms Required for High Speed Planes of the Future. Thomas E. Piper. *Automotive Industries,* v. 107, Sept. 15, 1952, p. 42-45, 114, 116.

Possibility of using synthetic materials in planes of future to replace alloys of Al and Mg. Favorable use of Ti and light-weight steels in these planes. Diagrams. (T24, Al, Mg, Ti, SS, SG-h)

511-T. General Purpose Machines Used to Make Packard Diesels. *Automotive Industries,* v. 107, Sept. 15, 1952, p. 52-53.

Equipment employed for operations on some of major parts of diesel engine. How the job is being done on small-lot basis. Includes a submerged arc welder. (T25, G general, K1)

512-T. Light Weight Packard Diesel. *Diesel Power and Diesel Transportation,* v. 20, Sept. 1952, p. 36-38.

Two light-weight, high-speed engines produced for the U. S. Navy. Al is used in place of cast iron and steel. (T25, Al)

513-T. Technical Facts for Food Processors on Nickel and High-Nickel Alloys. Part II. Metal Data on Brines, Juices, Dressings, Cereals, Vegetables. *Food Engineering,* v. 24, Sept. 1952, p. 95-97, 214. (Condensed from "Corrosion Resistance of Nickel and High-Nickel Alloys in Food Processing", International Nickel Co.)

Also includes corrosion data for Cu, Sn, Zn, brass, bronze, soft solder, mild steel, stainless steel, and Al. (T29, R7)

514-T. Removal of Radioactive Material From Water by Slurrying With Powdered Metal. William J. Lacy. *Journal, American Water Works Association,* v. 44, Sept. 1952, p. 824-828.

Method and procedure on a laboratory scale. Metals evaluated were Fe, Al, Cu, and Zn. Tables. (T29, Fe, Al, Cu, Zn)

515-T. Titanium Dioxide Rectifiers. R. G. Breckenridge and W. R. Hosler. *Journal of Research of the National Bureau of Standards,* v. 49, Aug. 1952, p. 65-72.

The rectifiers utilize a film of semiconducting titanium dioxide produced on titanium metal, prepared either by a two-step process involving a heating of metal in oxygen followed by a reduction of oxide in hydrogen or by a single heating of metal in water vapor. Properties compare favorably with existing types, particularly for high-temperature applications. Properties with regard to nature of counter electrode, and relation to theories of rectification. Tables and graphs. 22 ref. (T1, Ti)

516-T. Building the United States. *Marine Engineering and Shipping Review,* v. 57, Sept. 1952, p. 86-93.

Description of the ship includes notes on use of Al and steel. (T22, Al, ST)

517-T. The Production of Cast Nickel Anodes. Edmund R. Thews. *Metal Finishing,* v. 50, Sept. 1952, p. 70-74, 77.

Production methods to avoid at least a few disadvantages frequently characterizing the cast nickel anode in comparison with other anodes developed for this purpose. Impurities, gas absorption, melting and deoxidizing. 30 ref. (T5, E general, L17, Ni)

518-T. Light Alloy Luxury Yacht Built on Two-Way Tension System. *Metallurgia,* v. 46, Aug. 1952, p. 88.

Largest (60-ft.) all-aluminum yacht ever made in Britain. (T22, Al)

519-T. Light Alloy Roofing at Alexandra Palace. *Metallurgia,* v. 46, Aug. 1952, p. 100.

Use of aluminum. (T26, Al)

520-T. Germanium: Electronics' New Metal. *Modern Industry,* v. 24, Sept. 15, 1952, p. 54-55.

Brief pictorial account of applications. (T1, Ge)

521-T. Plate Making for the Metal Decorator. Joseph W. Mazzaferri. *National Lithographer,* v. 59, Sept. 1952, p. 31.

The metal plates now in use throughout the industry. (T9)

522-T. Cast Iron Pipe Relaid After 143 Years Continuous Use. *Pipe Progress,* v. 37, No. 3, p. 15. (Condensed from Journal of the British Waterworks Association, Apr. 1952).

Condition, composition, and microstructure of the old pipe. (T4, CI)

523-T. Aluminum Advances. *SAE Journal,* v. 60, Sept. 1952, p. 45-51. (Excerpts from "New Applications and Developments in Aluminum Alloys", by J. H. Dunn and E. P. White.)

Brazed castings, plaster and die castings, wiring, finishes. (T21, Al)

524-T. Aluminum for Building. *Architectural Forum,* v. 97, Sept. 1952, p. 152-157.

Al as a basic structural material. Brief comparison data on mechanical and physical properties of mild Al and mild steel.
(T26, Q general, P general, Al, ST)

525-T. Balanced Production at Ryan. *Aviation Age,* v. 18, Sept. 1952, p. 16-18, 23-24.

Production of tubular stainless steel exhaust systems for R-4360-59 Pratt & Whitney aircraft engines. A switch was made from "batch" methods to "flow"-type fabrication. Forming, machining, and spot and seam welding operations.
(T24, K3, G17, F26, SS)

526-T. Better Engine Controls Through Iso-Elastic. *Aviation Age,* v. 18, Sept. 1952, p. 33.

How Bendix Aviation Corp. made use of John Chatillon & Sons' high-Ni iron-base temperature-compensated alloy for calibrated compression springs for transmitters. Table of mechanical properties.
(T8, Q general, SG-b)

527-T. Canadian Stainless for Chemical Industries. John L. Cotsworth. *Canadian Chemical Processing,* v. 36, Sept. 1952, p. 70, 72, 74.

Advances made by Canada in manufacture of stainless steel. Corrosion resistance and mechanical properties. (T29, R general, Q general, SS)

528-T. Production Control of Printed Resistors. W. H. Hannahs and J. W. Eng. *Electronics,* v. 25, Oct. 1952, p. 106-109.

Analysis of factors affecting reproducibility of silk-screened resistors. Steps in manufacture, rejection rates, process variables, and critical factors. Process involves application of silver to glass. Graphs and photographs. (T1, Ag)

529-T. Carbide Tools Challenge Efficiency of Automatic Screw Machines. C. R. Morgan. *Iron Age,* v. 170, Oct. 2, 1952, p. 97-99.

Motor power, tool-setting facilities, stock loading, chip disposal, tool design, machine rigidity, lubrication, coolants, and inspection which must be considered in order to determine the balance of efficiency between carbide tools and screw machines. (T6, C-n)

530-T. Steel for Forming-Tools. J. Lomas. *Machinery Lloyd* (Overseas Ed.), v. 24, Sept. 13, 1952, p. 69-71, 74.

Main groups of toolsteel for plastic deformation; for shaping and trimming dies; for die-casting dies; and for punches, chisels, and shearing knives. Both hot and cold working steels are considered. (T5, TS)

531-T. Metal Powders in Industry. H. W. Greenwood. *Machinery Lloyd* (Overseas Ed.), v. 24, Sept. 13, 1952, p. 75, 77.

Some lesser known uses and functions of metal powders. Use of Cu brass or bronze for brazing; powdered solder; coatings of Zn or Al on Fe and steel; mixture of magnetic oxide of Fe and Al in welding; and cutting of refractory metal and alloys including stainless steel.
(T5, K8, Cu, Zn, Al, Fe, ST, EG-d)

532-T. New Titanium-Boron Alloy Steel Shows Promise for Jets and Rockets. John L. Everhart. *Materials & Methods,* v. 36, Sept. 1952, p. 96-98.

General description with emphasis on heat treatment, elevated-temperature properties and welding characteristics. It contains 0.022% B, 0.14% Ti, 2.91% Cr and 1.06% Mo.
(T25, AY, SG-h)

533-T. Indium Alloys Finding Important Commercial Uses. R. I. Jaffee and S. Marguerite Weiss. *Materials & Methods,* v. 36, Sept. 1952, p. 113-115.

Properties gained by alloying In with Pb, Sn, Cd, or Bi are put to use in bearings, solders, and glass sealing alloys. Graphs and photographs. 10 ref.
(T7, T5, In, Pb, Sn, Cd, Bi)

534-T. Selection, Care, and Maintenance of Wire Rope in Mining. A. J. King. *Mining Congress Journal,* v. 38, Sept. 1952, p. 22-24, 52.

Rules for selection and proper care of wire rope, and information

on mechanical properties. (T28, Q general)

535-T. Aluminum in Heavy Construction. W. C. Devereaux. *Modern Metals,* v. 8, Sept. 1952, p. 28-30, 32, 34-35.

See abstract under similar title, *Metal Industry,* item 491-T, 1951. (T26, Al)

536-T. Progress Report: Aluminum in Automobiles. J. H. Dunn and E. P. White. *Modern Metals,* v. 8, Sept. 1952, p. 42-43, 45-46, 48, 50-51.

See abstract, "Aluminum Advances", *SAE Journal,* item 523-T, 1952. (T21, Al)

537-T. Magnesium Die Castings in a New Fire Fighting Pump. *Modern Metals,* v. 8, Sept. 1952, p. 58, 60.

McCulloch Motors Corp., Los Angeles, applies principles that made its lightweight chain saw a success to production of a portable fire fighting pump. Brief coverage of casting aspects. (T4, E13, Mg)

538-T. Improved Rock Bit Lowers Drilling Cost in Hard, Abrasive Formations. Lyle L. Payne. *Oil and Gas Journal,* v. 51, Sept. 29, 1952, p. 226, 229.

Use and advantages of the new Hughest R-1 sintered tungsten carbide bit. Tables. (T6, W, C-n)

539-T. New Bit Speeds Drilling in Hard and Brittle Formations. E. G. Boice. *Oil and Gas Journal,* v. 51, Sept. 29, 1952, p. 240, 245.

The Cobra bit which has tungsten carbide inserts embedded in smooth rollers. Performance. (T6, W, C-n)

540-T. Core Materials for Small Transformers. C. C. Horstman. *Tele-Tech,* v. 11, Oct. 1952, p. 40-42, 90.

Use of a magnetic steel, Hipersil, which reduces weight and losses of transformers for magnetic amplifiers and airborne electronic equipment. Special grooving technique increases mechanical rigidity and temperature stability. Photographs, graphs, and diagrams. (T1, AY, SG-p)

541-T. Cobalt: Its Industrial Applications. J. B. Richardson. *Times Review of Industry,* v. 6, Sept. 1952, p. 22-24, 27.

Widespread use of Co in metallurgical, ceramic and other industries. Photographs and tables. (T general, Co)

542-T. The Use of Porcelain Enamel on Aluminum. Everan C. Woodland. *Ceramic Industry,* v. 59, Oct. 1952, p. 116, 154.

Use of above combination in Navy bulkheads. Future prospects. (T22, Al)

543-T. Properties of Chemical Engineering Materials of Construction. C. S. Grove, Jr., J. L. Vodonik, R. S. Casey, L. F. Yntema, and W. R. Bekebrede. *Industrial and Engineering Chemistry,* v. 44, Oct. 1952, p. 2371-2380.

Tabulated information on synthetic fibers and less common metals. Coverage of latter is limited to a supplement to 1950's table and deals with molybdenum. 21 ref. (T29, P general, Q general, Mo)

544-T. How Lead-Clad Steel and Copper Extend Lead Applications. Alfred P. Knapp. *Materials & Methods,* v. 36. Oct. 1952. p. 115-117.

By combining strength, electrical properties, and excellent corrosion resistance, clad metals overcome many disadvantages of Pb used alone. (T general, L22, Pb, Cu, ST)

545-T. Metals in the Jetomic Age. Allen G. Gray. *Steel,* v. 131, Oct. 13, 1952, p. 148-153.

Four different types of materials for ultra-high-temperature service in jet engines: metals and alloys, metals protected with ceramic coatings, ceramic materials, and combinations of metals and ceramics. Photographs and graphs. 12 ref. (T25, Q general, R general, SG-h)

546-T. Carbon Content Determines Boron Steel Behavior. A. S. Jameson. *Steel,* v. 131, Oct. 13, 1952, p. 154-156.

Use of boron steels in heat treated parts such as springs or axle shafts, which makes possible large savings in Ni and Mo. Present problem is in low-C carburizing and high-C grades. Comparative hardenabilities are charted. (T7, J28, AY)

547-T. Automotive Research. *Steel,* v. 131, Oct. 13, 1952, p. 166-168, 170, 173, 176.

Various research problems of General Motors and Ford Motor Co. laboratories, which include corrosion, substitution of materials, and design for substitute materials. (T21, R general, A9)

548-T. Applications and Advantages of Cast-Alloy Cutting Tools. Chester M. Adams. *Tool Engineer,* v. 29, Oct. 1952, p. 37-39, 47.

Three types of tool materials are high speed steel, cemented carbide, and cast alloy. Grades available, how to apply cast alloy tools, and selection of cast alloy. (T6, TS, C-n, Co, SG-j)

549-T. Gallium in Nuclear Reactors; Considerations for Use as a Primary Coolant. R. I. Jaffee, R. M. Evans, E. A. Fromm, and B. W. Gonser. *U. S. Atomic Energy Commission,* AECD-3317, Aug. 1, 1949. 38 pages.

Advantages and disadvantages of Ga and its possible alloys for this use. Most important properties are cross section for neutron absorption, heat-transfer efficiency, melting point, boiling point, and corrosive

effect on container metals. Corrosion resistance of W, Ta, Be, and Mo to molten Ga was studied. Conclusion is that Ga and its alloys are unsuitable as primary coolants for nuclear reactors.
(T25, P10, P11, P12, R6, Ga, W, Ta, Be, Mo)

550-T. Wire Rope Deservese Protection Against Wear and Weather. L. E. Dressler. *Drilling,* v. 13, Sept. 1952, p. 196-197.

See abstract of "Selection, Care, and Maintenance of Wire Rope in Mining". A. J. King, *Mining Congress Journal,* item 534-T, 1952.
(T28, Q general)

551-T. Printed Circuits for Home Radio Receivers. Elmer Waverling. *Electronics,* v. 25, Nov. 1952, p. 140-142.

Method for producing the circuits in which foil-thickness Cu is electroplated on an insulating base where conductors are desired and concurrently on walls of previously punched holes through the base. (T1, L17, Cu)

552-T. Ductile Iron. A New Engineering Material for Water Works Construction. C. T. Haller. *Journal, American Water Works Association,* v. 44, Oct. 1952, p. 912-922.

Internal structure, mechanical properties, production, and applications are considered. Micrographs, photographs, and graphs. 12 ref.
(T4, Q general, M27, CI)

553-T. Aluminum Alloys in Civil Engineering Practice. Parts 3-4. S. K. Ghaswala. *Light Metal Age,* v. 10, Aug. 1952, p. 21; Oct. 1952, p. 18, 20.
(T4, Al)

554-T. Beryllium-Copper Useful for Large Machine Parts. John T. Richards. *Materials & Methods,* v. 35, June 1952, p. 97-99.

High corrosion resistance, wear resistance, electrical conductivity, and impact strength are some of the properties that led to the choice of Be-Cu for five typical applications—dies for deep drawing stainless, flash welding electrodes, grinding machine clamps and seam welder wheel bushings.
(T7, T5, Q general, P15, R general, Cu)

555-T. Aluminum Foil. Thomas M. Hill. *Tappi,* v. 35, March 1952, p. 123A-130A.

Production; physical, mechanical, and chemical properties; corrosion resistance; and packaging characteristics. (T10, Al)

556-T. Ferrous Metal Tubing in Oil Refining Processes. H. D. Newell and J. J. B. Rutherford. *Third World Petroleum Congress, Proceedings,* sec. VIII, 1951, p. 13-14; disc. p. 43-49.
(T29, ST)

557-T. Large-Diameter High-Strength Pipe for Oil and Gas Transmission. Paul E. Noll. *Third World Petroleum Congress, Proceedings,* sec. IX, 1951, p. 29-48, disc., p. 49.

Characteristics of available high-strength pipe and their relation to pipeline design. Means of increasing strength, and characteristics and processes of manufacture of most common type of high-strength pipe, namely expanded or cold-worked pipe. Effect of expansion, both as affected by amount of deformation and by chemical composition of steel. Effect of heat on tensile properties of expanded pipe. An effective yield strength test of a section of pipe, in which incidental observations were made by means of brittle coating. Graphs and macrographs. (T4, F26, Q general, CN)

558-T. (German.) **Possibilities for Improvement of Bearings Made of Sintered-Metal Powders.** Theodor Hövel. *Stahl und Eisen,* v. 72, Sept. 11, 1952, p. 1157-1159.

Sintered iron-powder bearings with oil chambers, self-lubricating bearings made of sintered metal powders with graphite additions, advantages of supporting bushings of sintered iron powder, and multiface sleeve bearings made of sintered iron powder. (T7, H general, Fe)

559-T. The Role of Castings in the Agricultural Industry. William G. Gude. *Foundry,* v. 80, Nov. 1952, p. 114-117, 228, 231, 234.

Demand for above and comparison with consumption in other industries. Advancements in use of materials from early Cu castings to present-day steel, nodular iron, and malleable iron. (T3, CI, ST)

560-T. Material Selection Factor Significant in Bourdon Tubes. J. B. Giacobbe and A. M. Bounds. *Journal of Metals,* v. 4, Nov. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 1147-1148.

Lists ferrous and nonferrous materials used for Bourdon tubes in three groups—strain hardened, precipitation hardened, and heat treated (quenched and drawn), and analyzes each group with reference to corrosion resistance and ability to be soldered and brazed.
(T8, R general, K7, K8)

561-T. Sheathing Aluminium Cable. *Overseas Engineer,* v. 26, Nov. 1952, p. 138-139.

Process for sheathing Al cable now in use as a substitute for Pb.
(T1, Al, Pb)

562-T. High Temperature Metallurgy: Jetomic Age Demands It. Ber-

nard P. Planner. *Steel,* v. 131, Nov. 3, 1952, p. 98-100, 102.

Advantages and disadvantages of metals, ceramics, and their combinations for use in high-temperature environments. (T25, SG-h)

563-T. Aluminum Used for Main Girder of Emergency Dam at Morgantown. *Engineering News-Record,* v. 149, Nov. 13, 1952, p. 26.

Brief illustrated description. (T4, Al)

564-T. Magnesium in the Graphic Arts. Edward R. Owen. *Magazine of Magnesium,* Nov. 1952, p. 2-6.

Emphasis on Mg-alloy printing plates (flat and cylindrical). (T9, Mg)

565-T. Service Experience With Magnesium Bakery Equipment. Ralph G. Gillespie. *Magazine of Magnesium,* Nov. 1952, p. 10-13.

Equipment of Awrey Bakeries, Detroit. Advantages as compared to metals previously used. (T29, Mg)

566-T. *P-N* Junctions by Impurity Introduction Through an Intermediate Metal Layer. L. D. Armstrong. *Proceedings of the I.R.E.,* v. 40, Nov. 1952, p. 1341-1342.

An experimental method for making *p-n* junctions by alloying and diffusing In into *n*-type Ge through an intermediate thin layer of some other metal, such as Au, which has been plated on Ge. Applications were made to rectifiers and transistors. (T1, N1, Ge, In, Au)

567-T. Silicon *P-N* Junction Alloy Diodes. G. L. Pearson and B. Sawyer. *Proceedings of the I.R.E.,* v. 40, Nov. 1952, p. 1348-1351.

Features of these include large rectification ratios, ability to operate at high ambient temperatures, a flat Zener characteristic over several decades of current, and ability to operate usefully at frequencies up to 20 mc. Graphs and photograph. (T1, P15, Si)

568-T. Modern Developments in Drum Making. C. Gelderman. *Third World Petroleum Congress, Proceedings,* sec. IX, 1951, p. 50-60; disc., p. 60-63.

Survey covering past 30 years. Equipment and procedures for forming, arc welding of seams, and paint coating. (T29, G general, K1, L26, CN)

569-T. A Developmental Germanium *P-N-P* Junction Transistor. R. R. Law, C. W. Mueller, J. I. Pankove (Pantchechnikoff), and L. D. Armstrong. *Proceedings of the I.R.E.,* v. 40, Nov. 1952, p. 1352-1357.

A developmental germanium *p-n-p* junction transistor that may be readily made in laboratory by alloying Ta into opposite faces of a wafer of single-crystal *n*-type Ge. Graphs. (T1, Ge, In)

570-T. Metal-Carbon Composites for Mechanical and Electrical Parts. E. P. Eaton, Jr. *Product Engineering,* v. 23, Nov. 1952, p. 173-175.

Impregnation of C with molten Cu, Ag, or Cd produces a composite material with mechanical and electrical properties not obtainable in individual ingredients. Photograph and tables. (T1, T7, Cu, Ag, Cd)

571-T. Metals and Metal Processing in the Atomic Energy Field. Alan U. Seybolt. *Combustion,* v. 24, July 1952, p. 47-50.

Some properties of a few of the "newer" metals of more or less interest in the atomic energy program, and some of the processes used in manufacturing or fabricating these metals. Zr, Be, and Na are discussed at length. Processes of melting and casting, fabrication, welding, and powder metallurgy. (T26, E general, F general, G general, H general, Zr, Be, Na)

SECTION V

MATERIALS—

General Coverage of Specific Materials

1-V. Aluminum Alloy Characteristics. *American Foundryman,* v. 20, Nov. 1951, p. 56-59.

Tabular data compiled by Alloy Recommendation Committee, Aluminum and Magnesium Div., American Foundrymen's Society. Compositions, foundry, and other properties of sand-cast, permanent-mold-cast, and die-cast Al alloys. (Al)

2-V. Production and Properties of Aluminium Casting Alloys. F. H. Smith. *Foundry Trade Journal,* 91, Oct. 18, 1951, p. 439-446, 450; Oct. 25, 1951, p. 479-484; Nov. 8, 1951, p. 537-538; disc., p. 538-544.

Previously abstracted from *Institute of British Foundrymen.* Paper 1006, 1951. See item 114-V, 1951. (A8, Al)

3-V. Chrome Carbides Open New Fields of Application for Metallic Carbides. *Machine and Tool Blue Book,* Dec. 1951, p. 203-204.

New "Series 600" carbides now made by Carboloy Dept., General Electric Co., Detroit. (T general, C-n, Cr)

4-V. Zinc—Its Sources, Uses and Supply. Charles A. Scarlott. *Materials & Methods,* v. 34, Nov. 1951, p. 59-63.

An illustrated survey. (Zn)

5-V. High Carbon Steels. *Materials & Methods,* v. 34, Nov. 1951, p. 101.

Data sheet gives compositions, physical and mechanical properties, thermal treatments, fabricating properties, corrosion resistance, available forms, and uses of AISI C-1055, C-1060, C-1070, C-1080, and C-1095 steels. (CN)

6-V. Magnesium in the U. K.—Its Production and Uses. W. M. Doyle. *Times Review of Industry,* v. 5, Nov. 1951, p. 20-22.

An illustrated survey. (C general, T general, Mg)

7-V. Titanium in Western Aircraft Production; Advantages and Limitations. A. H. Petersen and N. J. Wells. **Titanium Takes the Test at Ryan Aeronautical.** William S. Cockrell. *Western Meals,* v. 9, Nov. 1951, p. 35-39.

Reports by two western aircraft manufacturers. Titanium's properties, advantages, specialized techniques for working, and practical applications in airframe production. (T24, Ti)

8-V. Metals for the West; Titanium Is on Its Way. Ralph G. Paul. *Western Machinery and Steel World,* v. 42, Nov. 1951, p. 96-98, 104.

Plant of Titanium Metals Corp., now under construction. Production, properties, and applications of Ti. (Ti)

9-V. Titanium. G. L. Miller. *Industrial Chemist and Chemical Manufacturer,* v. 27, Nov. 1951, p. 483-491.

Methods of producing Ti metal, its consolidation into usable forms, the technique of fabrication, and its properties. (Ti)

10-V. Stainless Steels. Luigi Piatti. *Chimia,* v. 5, Oct. 15, 1951, p. 221-228.

Reviews literature on theory of chemical resistance, metallurgical principles, classes and types of stainless steels. Welding problems, effects of alloying elements, and proper uses of stainless steels. 25 ref. (SS)

11-V. Recent Progress in the Metallurgy and in the Alloys of Titanium. (In French.) W. J. Kroll. *Metaux: Corrosion-Industries,* v. 26, Sept. 1951, p. 329-346.

A review. 63 ref. (Ti)

12-V. Titanium and Titanium Alloys. (In German.) Hans Otto Nicolaus. *Werkstoffe und Korrosion,* v. 2, Sept. 1951, p. 321-334; Nov. 1951, p. 416-424.

Part I: Basic raw materials, methods of production from the ore, physical and mechanical properties,

preparation of alloys, effect of nonmetallic elements, etc. Part II: Importance of Ti as an alloying element in iron metallurgy and especially in the manufacture of alloy steels. Effects of different high additions of Ti to the common nonferrous heavy metals and to Al. Some American experiences in machining and forming of Ti. 65 ref. (Ti)

13-V. The Development of Cemented-Carbide Alloys in Germany. (In German.) Ernst Ammann and Josef Hinnuber. *Stahl und Eisen,* v. 71, Oct. 11, 1951, p. 1081-1090.

Development of WC-Co alloys, influence of structure and properties, and practical applications. Those containing TiC are superseding previous compositions. Effects of addition of TaC. Mechanical properties, micrographs and macrographs. 51 ref. (C-n, W, Co. Ti)

14-V. Properties and Applications of Super-Purity Aluminum. (In Italian.) G. Missier. *Alluminio,* v. 20, Sept. 1951, p. 329-340.

Production methods, properties, and applications. 47 ref. (Al)

15-V. (Pamphlet) **Nickel and Its Alloys.** 72 pages. National Bureau of Standards, Washington, D. C. Report 485, Mar. 22, 1950.

Reviews all available information about Ni and its alloys, with particular attention to the physical properties and applications of the metal, and its ferrous and nonferrous applications. (A revision of *National Bureau of Standards,* Circular 100, issued in 1924.) 402 ref. (Ni, AY)

16-V. (Book) **Materials Handbook. Ed. 7.** George S. Brady. 850 pages. 1951. McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y. $8.50.

New edition covers 1300 additional materials, making a total of 8814. It also covers patented and tradenamed materials, principal ores and industrial chemicals, and much economic and geographic information. (V general)

17-V. SAE Steel Committee Leads Alloys Conservation Program. *Iron Age,* v. 168, Dec. 27, 1951, p. 74-76.

Technical advances, and applications of boron steel as it is used to replace the critical Ni, Mo, and Cr alloys. (T general, AY)

18-V. Properties and Application of Ductile Iron. G. L. Cox. *Iron and Steel Engineer,* v. 28, Dec. 1951, p. 75-83; disc., p. 83-84.

Chemical composition,, mechanical properties, heat treatment effects, and resistance to corrosion. 12 ref. (Q general, J23, R general, CI)

19-V. Something New In Carbides. *Screw Machine Engineering,* v. 13, Dec. 1951, p. 38-40.

Mechanical and physical properties of a new series of chromium carbides developed by Carboloy Dept. General Electric Co. Applications to bearings, welding rods for deposition of carbide surface coatings, and to precison gages. Miscellaneous properties are summarized. (Q general, T general, Cr, Q, C-n)

20-V. Zirconium—An Old New Metal. Harold J. Read. *Mineral Industries,* v. 21, Dec. 1951, p. 3, 6.

Difficulty in extracting Zr from the ore, methods of refining, adverse effect of impurities, applications, uses, and advantages over Ti and other metals. (Zr)

21-V. Cast Alloy Reference Sheet. N. S. Mott. *Chemical Engineering Progress* (Engineering Section), v. 47, Dec. 1951, p. 654.

Miscellaneous properties of low-carbon 25% Cr, 12% Ni steel. Emphasis is on corrosion resistance—qualitative resistance to a large number of common chemicals and industrial materials. (R general, SS)

22-V. New Chromium Carbides Have High Temperature and High Corrosion Resistance. *Materials & Methods,* v. 34, Dec. 1951, p. 69.

Important features and experimental applications. (Cr, C-n)

23-V. Titanium, Zirconium, Molybdenum, Tungsten, Tantalum, Columbium, Vanadium, Hafnium as Engineering Materials. John L. Everhart. *Materials & Methods,* v. 34, Dec. 1951, p. 89-104.

A series of comprehensive articles on engineering properties, forming and machining characteristics, weldability, cleaning and finishing characteristics, and present and potential uses. Tabulated and illustrated data. (Ti, Zr, Mo, W, Ta, Cb, V, Hf)

24-V. Pure Vanadium: A Promising Engineering Material. *Steel,* v. 129, Dec. 31, 1951, p. 52-55.

Fabricating, mechanical, and physical characteristics. The metal also has high salt-water corrosion resistance and negligible magnetic susceptibility. Stress-strain diagrams for the pure metal. (V)

25-V. Less Familiar Metals of Commercial Importance. Robert A. Lubker. *Mechanical Engineering,* v. 74, Jan. 1952, p. 3-8, 18.

Availability, production processes, properties, alloys, cost, and uses of 20 metals which are relatively uncommon but of appreciable or potential industrial importance. (EG-a)

26-V. Man of the Year: Young Mister Magnesium. F. L. Church. *Modern Metals,* v. 7, Dec. 1951, p. 24-25, 27-28, 30-32, 34, 36.

Progress of the Mg industry to date. Fabrication of a Mg carrying case. Practices of the die-casting department. (A4, E13, Mg)

27-V. Materials for High-Temperature Use. Clyde Williams. *Monthly Business Review,* v. 34, Jan. 1952, p. 16.

Recent developments in metals, alloys, ceramics, and their combinations. (SG-h)

28-V. Molybdenum: Our Most Promising Refractory Metal. J. J. Harwood. *Product Engineering,* v. 23, Jan. 1952, p. 121-132.

Properties and applications. Includes sections on mining and production methods, physical and mechanical properties, high-temperature properties, oxidation and corrosion, fabrication and processing, welding, alloy compositions, and applications. 14 ref. (Mo, SG-h)

29-V. Boron Steels Supplement Scarce Nickel, Moly Alloys. Donald H. Ruhnke. *Steel,* v. 130, Jan. 14, 1952, p. 66, 69-70, 72, 75.

Present status of boron steels. Results to date on hardenability, mechanical properties and users' reaction to these steels. (Q general, J26, AY)

30-V. Precipitation-Hardening Stainless Cuts Hand Work and Rejects on Aircraft Parts. F. Robert Kostock. *Western Metals,* v. 9, Dec. 1951, p. 32-34.

A new Cr-Ni stainless steel produced by Armco Steel Corp. Can be heat treated at relatively low temperatures to high strength and hardness. Pickling practices, welding techniques and typical applications of this new alloy. (SS)

31-V. Magnesium and Its Alloys in 1951. R. G. Wilkinson. *Metallurgia,* v. 44, Dec. 1951, p. 299-302.

Present status of Mg. Recently developed alloys with improved mechanical properties which find increasing application in many spheres. Casting and wrought alloys, and argon-arc welded Mg alloy tubing. (Mg)

32-V. Copper and Copper Alloys. 5. Manganese Bronze Alloyed With Nickel. (In Dutch.) *Metalen,* v. 6, Sept. 15, 1951, p. 328-329; Oct. 15, 1951, p. 366-368; Nov. 15, 1951, p. 404-405.

Includes tabulated data on chemical compositions and properties. Part 6 (Nov. 15 issue) deals with refining of native, blister, and "black" copper from various sources. (To be continued.) (C21, Cu)

33-V. (Book) **Cutting-Tool Materials.** Eric N. Simons. 180 pages. Sir Isaac Pitman & Sons, Ltd., 39 Parker St., Kingsway, London, England. 21s.

Each group of alloys is treated systematically, with detailed information on compositions, characteristics, applications, forging, and heat treatment, including types of furnace. Two chapters cover grinding the tools, and testing and inspection of toolsteels. Appendices on compositions, designs, etc. (SG-j, TS, C-n)

34-V. (Book) **Gmelins Handbuch der anorganischen Chemie. System-Nummer 68, Teil A. Lieferung 5 und 6. Platinum.** (Gmelin's Handbook of Inorganic Chemistry. System No. 68, Part A, Sections 5 and 6. Platinum.) Ed. 8. 321 pages, (p. 533-854). 1951. Verlag Chemie G.m.b.H., Hauptstrasse 127, Weinheim Bergstrasse, Germany. 79DM.

Comprehensive reference volume to the world's literature on Pt, particularly its alloy systems. The section on history and location of deposits covers literature to the end of 1937; the section on recovery and preparation of platinum metals, their applications, special forms, and colloidal solutions covers literature to June 1939; the section on analytical methods covers literature to Jan. 1940; and the sections on alloys of Pt cover literature to June 1948 (some to the end of 1949). (EG-c, Pt)

35-V. (Book) **Steels in Modern Industry.** W. E. Benbow. 562 pages. Iliffe & Sons, Ltd., Dorset House, Stamford St., London S.E.1, England. $5.88.

Uses and properties of modern steels, keyed to the needs of designers and engineers. An introductory section briefly discusses basic metallurgy. Twenty-nine specialists have contributed to the 25 sections, each of which tells the properties of various steels, their treatments, and their applications. (ST)

36-V. Boron Engineering Steels. Charles M. Parker. *Machine Design,* v. 24, Jan. 1952, p. 161-162, 206, 208.

Previously abstracted from *Steel.* See item 153-V, 1951. (AY, B)

37-V. The Refractory Metals. L. F. Yntema. *Record of Chemical Progress,* v. 12, Fall 1951, p. 177-183.

Problems of processing Cb, Ta, Mo, and W and some of their uses in metatllic form. Processes include reduction and refining, powder metallurgy, and ceramic coatings for these metals; also their electrodeposition on nonrefractory metals. (Cb, Ta, Mo, W, EG-d)

38-V. A Century of Magnesium: 1852-1952. C. J. P. Ball. *Research,* v. 5, Jan. 1952, p. 5-9.

History of Mg and how its development has been associated with wartime demands for the metal. Summary of unsolved problems. (Mg)

39-V. Cupro-Nickel Castings. James S. Vanick. *Foundry,* v. 80, Feb. 1952, p 100-105, 246, 248, 250-253.

Effects of various additions, effects of heat treatments, and mechanical and physical properties. Practices in welding, brazing, and soldering. Uses of Cu-Ni alloys. Graphs, tables and illustrations. (Cu, Ni)

40-V. Vanadium-Base Alloys. William Wilson, Jr. *Journal of Metals,* v. 4, Feb. 1952, p. 144.

Research in progress. Includes exploration of physical properties, effects of alloying elements and of heat treatments. (V)

41-V. The Outlook for 1952. *Light Metals,* v. 15, Jan. 1952, p. 6-32.

After a forword by E. G. West, the following articles are given: "Bauxite from Jamaica," Harold Champion; "Exploitation of Bauxite in Hungary," (anon.); "Canada's Expanding Aluminium Production," (anon.); "New Aluminium Smelter for Norway," (anon.); "More Plant to Meet Raising Aluminium Demand in U. S. A.," (anon); "Magnesium in Canada," H. G. Warrington; "The Industry in the World To-Day," (anon.); "Planning Ahead," (anon.); "Magnesium in Britain," R. G. Wilkinson; "Enterprise in Association," (anon.); "Production of Aluminium in Great Britain," (anon.); "Anticipated Demands for Aluminium Basic Products," (anon.); "Increasing Capacity for Electrolytic Finishing," (anon.); and "Aluminium Will Lead," (anon.) (Al, Mg)

42-V. A Review: Current Magnesium Alloy Compositions. J. C. McDonald. *Modern Metals,* v. 7, Jan. 1952, p. 40-41.

Recent progress in the improvement of Mg alloys, both wrought and cast. New alloying ingredients such as Zr with its grain-refining effect, and rare earths with their ability to endow Mg with high-temperature characteristics comparable with those of the best Al alloys. (Mg)

43-V. Titanium Production Up. *Steel,* v. 130, Feb. 4, 1952, p. 117, 120, 123-124, 126, 129.

Improvements in the manufacturing process, varied uses in view of its properties, and increased output. (Ti)

44-V. "Recidal." Characteristics of a New High-Resistance, Free-Cutting Light Alloy. (In Italian.) *Alluminio,* v. 20, Nov. 1951, p. 471-488.

Advantages and disadvantages. Alloy contains 4.0% Cu, 1.5% Fe, 0.6% Mg, 0.7% Si, 0.2% Ti, 1.0% Pb-Cd, and the remainder Al. Photographs, micrographs, tables, and charts. 111 ref. (Al, SG-k)

45-V. Recent Information on High Speed Steels. (In Spanish.) Haufe. *Instituto del Hierro y del Acero,* v. 4, Jan.-Mar. 1951, p. 86-90. (Translated from *Polytechnisch Tijdschrift,* Mar. 21, 1950, p. 198-203.)

Compositions and capabilities of German types in 1949; economic aspects of various compositions; influence of tempering; low-temperature and other treatments. Data are tabulated and charted. (TS)

46-V. Properties of Hard Metals. (In Spanish.) Walter Tofaute and J. Hinnüber. *Instituto del Hierro y del Acero,* v. 3, Oct.-Dec. 1950, p. 261-269.

Composition and classification of sintered carbide and carbide-metal compositions, methods for avoiding cracks due to welding stresses; elasticity; resistance to heat, oxidation, and corrosion; and progress in methods of fabrication. Micrographs, tables, and photographs. (C-n, SG-j)

47-V. Gallium. (In Spanish.) Mauricio Béja. *Nucleo,* v. 6, Sept. 1951, p. 1-8.

Properties and characteristics. Includes spectrograms and photographs. 56 ref. (Ga)

48-V. Copper and Copper Alloys; A Survey of Technical Progress during 1951. E. Voce. *Metallurgia,* v. 45, Jan. 1952, p. 16-22.

Raw-material resources, extraction, fabrication, finishing, and properties. 188 ref. (Cu)

49-V. Alloy Conservation: Boron Fills the Bill. Alexander H. d'Arcambal. *Steel,* v. 130, Feb. 18, 1952, p. 107-108.

Properties, advantages, limitations, and applications of boron steels. (AY)

50-V. New Magnesium-Zirconium Casting Alloy. J. M. Payne, A. D. Michael, and R. W. Eade. *Metal Industry,* v. 80, Feb. 8, 1952, p. 103-104.

A new Mg casting alloy containing Zr, Zn and a rare earth was developed to meet special mechanical-strength requirements. This alloy has found application on a large scale for stressed castings. (Mg)

51-V. The Titanium Alloys Today. Walter L. Finlay and Milton B. Vordahl. *Metal Progress,* v. 61, Feb. 1952, p. 73-78.

An over-all view. Differences between α and β alloys. Some mechanical properties of the alloys and heat treatment practices. Micrographs. (Ti)

52-V. Magnesium Alloys. F. A. Fox. *Research,* v. 5, Feb. 1952, p. 77-81.

Surveys present status of development, in comparison with those available in 1940. Mechanical and physical properties, as well as microstructure. (Mg)

53-V. Round-Up on Titanium, V. A Technical Summary of Properties. N. P. Harvey. *South African Mining and Engineering Journal,* v. 62, Jan. 26, 1952, p. 945-947. (Reprinted from *Iron and Coal Trades Review.)*

Physical and mechanical properties, fabrication, structures, alloying element effects, etc. 19 ref. (Ti)

54-V. Titanium and Its Alloys. H. W. Worner. *Australasian Engineer,* Jan. 7, 1952, p. 46-51.

Published information is reviewed in the light of some general physical laws pertaining to alloys. Mechanical properties from the standpoint of the relationships between properties, structure, and heat treatment. A few types of promising heat treatable alloys. Present uses and possible future applications of Ti-rich alloys. 23 ref.
(Q general, T general, Ti)

55-V. Titanium Is Tough. Helen M. Davis. *Chemistry,* v. 25, Feb. 1952, p. 1-6.

Advantages of Ti over Fe. Sources and form in which it is found and the various methods by which it is produced. (Ti)

56-V. Boron Steels—a New Era in Alloy Metallurgy. *Journal of American Society of Naval Engineers, Inc.,* v. 64, Feb. 1952, p. 134-140. (Excerpts from article by D. I. Brown.) *Iron Age,* v. 168, July 5, 1951, p. 79-85; July 12, 1951, p. 85-90; July 19, 1951, p. 102-106; July 26, 1951, p. 68-72; Aug. 9, 1951, p. 75-79; disc., p. 79-80.)

Previously abstracted from *Iron Age.* See item 109-V, 1951. (AY)

57-V. Copper and Copper Alloys; A Survey of Technical Progress During 1951. E. Voce. *Metallurgia,* v. 44, Dec. 1951, p. 303-308.

Raw material resources, extraction, fabrication, finishing and properties. 85 ref. (To be continued.)
(Cu)

58-V. Aluminium and Its Alloys in 1951; Some Aspects of Research and Technical Progress Reported. E. Elliott. *Metallurgia,* v. 45, Feb. 1952, p. 75-80.

Attention is drawn to published work reporting research and technical progress in the various aspects of the metallurgy of aluminum and its alloys, including extraction, founding, fabrication, constitution and properties. 75 ref. (Al)

59-V. An Investigation of Boron and Other Low-Alloy Steels. Part I. H. B. Knowlton. *Steel Processing,* v. 38, Feb. 1952, p. 72-75.

The present status of boron and other alloy steels, and the basis upon which these steels have been selected, tested, and used. Data on chemical composition and mechanical properties. Tables. (To be continued.) (AY)

60-V. Tool Materials. Lester F. Spencer. *Tool Engineer,* v. 28, Mar. 1952, p. 129-131.

Reviews characteristics. Includes cemented titanium carbides, high-speed Mo steels, and several non-deforming oil and air hardening toolsteels. (TS, Ti, C-n)

61-V. Titanium Takes a Test. J. Segard. *Welding Engineer,* v. 37, Mar. 1952, p. 24-27.

Results of tests conducted by Ryan Aeronautical to determine the suitability of Ti to production of aircraft components. Tests included cold and hot forming, spot welding, heat treating, deformation, and machining.
(Q general, K3, G general, Ti)

62-V. Applications of Stainless Steels. (In French.) H. Forder. *L'Ossature Métallique,* v. 16, Dec. 1951, p. 599-602.

Compositions, mechanical and physical properties, and applications.
(T general, SS)

63-V. High Speed Steels. (In French.) André Michel. *Métallurgie et la Construction Mécanique,* v. 83, Nov. 1951, p. 873-875, 877.

Brittleness; residual austenite; high-temperature hardness; structure; carbide formation; quenching and tempering; effects of C, Cr, W, Mo, V, and Co; trend of research; and future prospects.
(Q general, M27, TS)

64-V. (Book) **Gemeinfassliche Darstellung des Eisenhüttenwesens.** (Comprehensive Treatise on Ferrous Metallurgy.) Ed. 15. 258 pages. 1949. Verlag Stahleisen, M.B.H., Düsseldorf, Germany.

The beneficiation of iron ore, coking of coal, refractory materials, smelting, innovations in iron and steel production, and modern metallurgical furnaces and other equipment. Includes a survey of iron and steel production in principal countries of the world. Numerous tables, charts, diagrams, and illustrations.
(B general, D general, A4, Fe, ST)

65-V. Titanium: How Will You Use This New Metal? *Modern Industry,* v. 23, Mar. 15, 1952, p. 44-50.

Semipopular treatment of results of first three years of commercial development. Production, properties, potential uses, and economics. (Ti)

66-V. Titanium; Its Processing and Subsequent Mechanical Properties. *SAE Journal,* v. 60, Mar. 1952, p. 21-25. (Excerpts from "Design and Manufacturing Techniques With Titanium", by O. A. Wheelon.) (To be published in full in *SAE Quarterly Transactions.*)

Includes physical properties, welding, machining, corrosion resistance, production difficulties, and comparative data for Ti, Al, steel and Monel. (Ti)

67-V. Stainless Clad Steels. Helmut Thielsch. *Welding Journal,* v. 31, Mar. 1952, p. 142s-160s.

Manufacturing methods, carbon diffusion, physical and mechanical properties, heat treatments, welding procedures and processes, dilution, selection of welding electrodes and flame cutting. Photomicrographs, diagrams, and tabular data. 81 ref. (K general, SS, CN)

68-V. Ceramics and Metallurgy. H. W. Greenwood. *Machinery Lloyd* (Overseas Ed.), v. 24, Mar. 1, 1952, p. 89-91.

Recent applications of ceramics in aiding resistance of metals to corrosion, erosion and high temperatures, in the forms of ceramic bodies, coatings, or ceramic-metal combinations. (SG-g, h)

69-V. Titanium; Occurrence, Extraction, Workability, and Properties of the Metal and Its Alloys. A. D. Merriman. *Metal Treatment and Drop Forging,* v. 19, Mar. 1952, p. 99-106. (Ti)

70-V. Decontrolled Stainless: a Solution to Shortages. *Steel,* v. 130, Mar. 24, 1952, p. 72-74.

Lists various straight Cr grades giving pertinent data, such as composition, wear and corrosion resistance, machinability, applications, and price. (SS)

71-V. Newly Developed Bronze Alloys Feature Anti-Galling and Corrosion Resistance. John P. Meyer. *Western Metals,* v. 10, Mar. 1952, p. 35-36.

Two new types developed by Olds Alloys, Los Angeles are a white bronze of the Cr-Ni-Mo type and a Ni bronze of unusually high Pb content. Properties, applications. (Cu)

72-V. Iron. Walter Carroll. "Encyclopedia of Chemical Technology. Vol. 8" (Interscience Encyclopedia, New York), 1952, p. 18-45.

Covers allotropy; physical properties; minerals; sources of iron; extraction of iron from its ores; pig iron; openhearth iron; wrought iron; and electrolytic iron. (P general, B general, D general, Fe)

73-V. Iron Alloys. Walter Carroll. "Encyclopedia of Chemical Technology. Vol. 8" (Interscience Encyclopedia, New York), 1952, p. 45-53.

Relationship betwen the terms "iron" and "steel". The ferro-alloys, and the recently developed group of high-temperature alloys. (Fe, Fe-n, SG-h)

74-V. Lead. T. D. Jones. "Encyclopedia of Chemical Technology. Vol. 8" (Interscience Encyclopedia, New York), 1952, p. 217-253.

Physical and chemical properties, resources, ore beneficiation, smelting, and refining—the last two in greatest detail. Diagrams, graphs, tables. 18 ref. (C21, B general, Pb)

75-V. Lead Alloys. C. H. Hack. "Encyclopedia of Chemical Technology. Vol. 8" (Interscience Encyclopedia, New York), 1952, p. 253-266.

Properties and uses of the various grades of Pb and Pb alloys. Includes specifications, phase diagrams, fabrication and welding processes. Many of the principal uses of Pb alloys are discussed under other headings. (Pb)

76-V. Magnesium and Magnesium Alloys. Allan L. Tarr. "Encyclopedia of Chemical Technology. Vol. 8" (Interscience Encyclopedia, New York), 1952, p. 554-593.

History, physical and chemical properties, reactions, analysis, corrosion, production methods (the most detail here), alloys—their properties, microstructure, and transformations, fabrication, finishing, and applications. 34 ref. (Mg)

77-V. Manganese and Manganese Alloys. J. H. Brennan and Charles Longenecker. "Encyclopedia of Chemical Technology. Vol. 8" (Interscience Encyclopedia, New York), 1952, p. 718-735.

History, physical and chemical properties, resources, minerals and their beneficiation, smelting, ferromanganese and silicomanganese production, and alloys—properties and applications. 19 ref. (Mn)

78-V. Mercury. G. A. Roush. "Encyclopedia of Chemical Technology. Vol. 8" (Interscience Encyclopedia, New York), 1952, p. 868-882.

History, physical and chemical properties, occurrence, production processes, alloys, health hazards, economic aspects, and uses. (Hg)

79-V. How to Work With Beryllium-Copper Strip. John T. Richards. *Amer-*

ican Machinist, v. 96, Mar. 31, 1952, p. 99-114.

Press working, heat treating, soldering, brazing, welding, cleaning, and electroplating. Engineering properties of Be-Cu strip, and factors to be considered in designing parts to be produced from it. Graphs, tables, and illustrations. (Cu)

80-V. Nickel-Base Nonferrous Castings. James Vanick. *Foundry,* v. 80, Apr. 1952, p. 94-97, 257-258, 260-261.

Production, composition, properties, corrosion resistance, and welding of Ni-base casting alloys. Graphs and tabular data. (E general, Ni)

81-V. Field of Cemented Carbides Expanded by Titanium Compositions. John C. Redmond and John W. Graham. *Metal Progress,* v. 61, Apr. 1952, p. 67-70.

Properties, fabrication, and application of Kentanium. Comparison is made with tungsten carbide and superalloys. (Ti, W, C-n)

82-V. Utilization of Tungsten. (In French.) *Métallurgie et la Construction mécanique,* v. 83, Jan. 1952, p. 25-27, 29; Mar. 1952, p. 159, 161-162.

Ferrotungsten and its production. Effects of tungsten in carbon and alloy steel. Percentage compositions of tungsten in steels recommended for various purposes. Includes tables and graphs. (Fe-n, W, AY)

83-V. (Book) **Symposium on Titanium.** 106 pages. 1950. Research and Development Board, Dept. of Defense, Washington, D. C.

Talks, papers, and discussions presented Nov. 8-9, 1950. Includes "The Trends of the Electric Power Industry in the United States and Their Relation to Titanium Production", by J. W. Swaren. Other participants included B. S. Mesick, Leonard Jaffee, H. J. Boertzel, W. Lee Williams, Oscar Marzke, J. J. Harwood, Richard R. Kennedy, H. K. Adenstedt, A. B. Kinzel, E. I. Larsen, and V. W. Whitmer. (Ti)

84-V. Copper and Copper Alloys. Clement Blazey. *Australasian Engineer,* Feb. 7, 1952, p. 69-75. (From Symposium on "Modern Trends in Non-Ferrous Metals and Alloys".)

Summarizes the present position of Cu and Cu alloys, from both research and practical aspects, in general terms. Changes and trends in production and uses of Cu; reasons for believing that plain Cu and Cu-Cd will retain their position as the principal electrical conductors. Composition, heat treatment, and properties of typical age or temper-hardening alloy. The manner in which established alloys are being modified in composition for both general and special uses. Study of creep and fatigue. 12 ref. (Cu)

85-V. The Aluminium Industry History, Production Processes, Future Prospecs. L. W. Malmgren. *Australasian Engineer,* Feb. 7, 1952, p. 82-91. (Al)

86-V. Cast Alloy Reference Sheet. N. S. Mott. *Chemical Engineering Progress* (Engineering Section), v. 48, Apr. 1952, p. 208.

Data on highly corrosion resistant 20-29-2-3 Cr-Ni-Mo-Cu alloy for machinability, heat treatment, weldability, corrosion resistance, and mechanical and physical properties. Especially useful for handling hot corrosive chemicals. (R5, R6, R7, SS)

87-V. Spheroidal-Graphite Iron up to Date. W. W. Braidwood. *Foundry Trade Journal,* v. 92, Mar. 27, 1952, p. 323-329; Apr. 3, 1952, p. 361-366, Apr. 10, 1952, p. 393-394.

Progress of spheroidal-graphite iron to date, and forecasts its future. Nomenclature, properties, specifications, microstructure, heat treatment, hardness, machinability, heat resistance, and casting. 31 ref. (CI)

88-V. Gallium. G. H. Wagner and W. H. Gitzen. *Journal of Chemical Education,* v. 29, Apr. 1952, p. 162-167.

General discussion. History, properties, occurrence, recovery, analysis, production and prices, and uses. 39 ref. (Ga)

89-V. Carbon and Graphite Materials and Parts. Philip O'Keefe. *Materials & Methods,* v. 35, Apr. 1952, p. 119-133.

Engineering properties, fabrication and design, mechanical parts, electrical, refractory, and chemical applications. (C)

90-V. Properties and Use of Nickel and Its Alloys. W. H. Dennis. *Mine & Quarry Engineering,* v. 18, Mar. 1952, p. 73-80; Apr. 1952, p. 123-128.

A general discussion. Includes illustrations, graphs, and tabular data. (T general, Ni)

91-V. Stainless Clad Copper for High Temperature Service. Joseph Kinney, Jr. *Product Engineering,* v. 23, Apr. 1952, p. 129-133.

Offers a combination of the high thermal conductivity of Cu with the corrosion and heat resistance of stainless steel. Data on mechanical and physical properties, workability, corrosion resistance, annealing, and welding are charted. (Cu, SS, SG-g, h)

92-V. Cemented Carbide Families Grow. J. S. Gillespie and I. L. Wallace. *Steel,* v. 130, Apr. 21, 1952, p. 84.

New developments, properties, corrosion and heat resistance data, and applications. (C-n)

93-V. Titanium. *Welding Journal,* v. 31, Apr. 1952, p. 330-331.

A general discussion. (Ti)

94-V. High Strength Nonheat-Treated Aluminum Casting Alloys. Walter Bonsack. *American Foundrymen's Society,* Preprint 52-44, 1952, 7 pages.

Compositions and properties, comparing the modern Al-Mg-Zn types with the older heat treatable casting alloys. Tables and graphs give compositions, mechanical properties, and aging effects. Corrosion resistance, brazability, machinability, dimensional stability, and castability. (Al)

95-V. Fe-Ni-Co Alloys for Glass to Metal Seals. K. H. Mairs. *Journal of Metals,* v. 4, May 1952, p. 460-464.

History, composition, properties, microstructure, effects of heat treatment, and uses for Kovar and Fernico alloys. Tables, diagrams, and photomicrographs.

(K11, M27, J general, P11, Fe. SG-s)

96-V. History and Development of Aluminium Silicon Alloys. E. Scheuer. *Proceedings of the Institute of British Foundrymen,* v. 44, 1951, p. B40-B49.

History of Al-Si alloys from their first preparation roughly 100 years ago, to their first industrial application in 1920. Theoretical aspects of the modification process; development of other Al-Si alloys combining the good casting properties of the eutectic alloy with better machinability and greater stiffness. Special applications of Al-Si alloys, including a group developed for pistons which exploits the low coefficient of expansion and high wear resistance produced by Si additions, and the few specific cases where Al-Si alloys are utilized in the wrought form. 36 ref.

(T general, Q general, Al)

97-V. Where Is Cast Iron Going To? P. A. Russell. *Proceedings of the Institute of British Foundrymen,* v. 44, 1951, p. B110-B120; disc., p. B120-B123.

Economic and technological trends. Mechanical properties and microstructures.

(T general, Q general, M27, CI)

98-V. Production and Properties of Aluminium Casting Alloys. F. H. Smith. *Proceedings of the Institute of British Foundrymen,* v. 44, 1951, p. A198-A217; disc., p. A217-A221.

Previously abstracted from *Institute of British Foundrymen;* item 115-V, 1951. (A8, Al)

99-V. Non-Ferrous Metals in Engineering. G. L. Bailey. *Times Review of the Progress of Science,* Aug. 1951, p. 2-3.

Brief review of recent developments emphasizing heat and corrosion resistant alloys and production of sound castings.

(T general, E25, EG-a, SG-g, h)

100-V. Titanium Carbide: a Very Refractory and Light Substance. (In French.) M. Oswald. *Métaux: Corrosion—Industries,* v. 27, Feb. 1952, p. 75-87.

Heat resistance; solvent properties for other elements (including the systems Ti-C-N, Ti-C-O, Ti-C-N-O, TiC-N-Zr, Ti-C-N-Cb, Ti-C-N-V, and systems with nonisomorphous carbides); density of TiC and some of its solid solutions; production and applications; and general conclusions. Tables and graphs. 21 ref. (Ti, C-n)

101-V. Some Characteristics and Special Features in Development of Aluminum and Aluminum Alloys. (In German.) W. Bleicher. *Aluminium,* v. 28, Jan.-Feb. 1952, p. 20-27.

Preparation of alloys, manufacture of semifinished products, and their processing. Diagrams, graphs, micrographs, and photographs. (Al)

102-V. Chromium; Ranks Among the Most Strategic of Metals. Roland D. Parks. *Mining Engineering,* v. 4, May 1952, p. 469-475.

Metallurgical uses, grades of ore and deposits, world reserves, and demand. Table gives world production of chromite. (A4, B10, Cr)

103-V. How to Substitute a Boron Steel. *SAE Journal,* v. 60, May 1952, p. 74-77. (Excerpts from "Boron and Other Low Alloy Steels", by Harry B. Knowlton.)

See abstracts of "An Investigation of Boron and Other Low-Alloy Steels", *Steel Processing;* items 59-V and 104-V, 1952. (AY)

104-V. An Investigation of Boron and Other Low-Alloy Steels. Parts II and III. H. B. Knowlton. *Steel Processing,* v. 38, Mar. 1952, p. 131-133; Apr. 1952, p. 186-190.

See abstract of Part I; item 59-V, 1952. (AY)

105-V. The Future of the Light Metals. H. Sutton. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 246-252; disc., p. 265-268.

Early history and essential features of modern methods of production. Possible alternative methods. Recovery of aluminum from scrap

and used parts. Applications. Recent advances in the Mg-alloy field. Position of the less common light metals, Be and Ti. 36 ref.
(Al, Mg, Be, Ti)

106-V. The Future of Light Metals With Special Reference to Titanium. Oliver C. Ralston. "Proceedings of the United Nations Scientific Conference on the Conservation and Utilization of Resources. Vol. II. Mineral Resources", 1951, p. 252-254; disc., p. 265-268.

Brief review. (Ti)

107-V. (Book) Electrolytic Manganese and Its Alloys. Reginald S. Dean. 257 pages. Ronald Press Co., 15 E. 26th St., New York 10, N. Y. $12.00.

Growth of electrolytic Mn production since 1936. Restricted to production of electrolytic Mn, to properties and uses of alloys in which it is necessary, and to alloys in which electrolytic Mn produces properties significantly different from the use of other Mn types. Much material in the book was obtained from reports issued by the Bureau of Mines. (C23, Mn)

108-V. New 17-7PH Stainless Working Techniques. Gilbert Close. *Aviation Age,* v. 17, May 1952, p. 49-53.

A precipitation hardening alloy developed primarily for sheet, strip, plate, and wire applications. It is available also in angles, bars and forging billets. Usually supplied in the annealed condition with an ultimate tensile strength ranging from 115-150,000 psi., a tensile yield strength of 35-55,000 psi., and an elongation of 20-40%. Offers corrosion resistance superior to that of any of the standard Cr stainless steels along with higher mechanical properties than any of the Cr-Ni types. (SS)

109-V. Cast Alloy Reference Sheet. N. S. Mott. *Chemical Engineering Progress* (Engineering Section), v. 48, May 1952, p. 266.

Emphasis is on chemical corrosion resistance of 65% Ni, 32% Cu (cast Monel) alloy. Mechanical and physical properties, machinability, heat treatment, weldability, and applications are also listed. (R general, Ni)

110-V. Developments in Nickel. O. B. J. Fraser. *Industrial and Engineering Chemistry,* v. 44, May 1952, p. 950-954.

Discovery of Ni, developments in its technology and utilization, and history of the metallurgy by which it has been won from its ores. Some physical data, statistical information to aid in defining the position of Ni in the world's affairs, and comments on the distribution of Ni minerals in the earth's crust and the locations of ore bodies, past and present. 11 ref. (B general, A4, Ni)

111-V. Titanium and Its Alloys. John L. Everhart. *Materials & Methods,* v. 35, May 1952, p. 117-132.

Special section covers engineering properties; forming and machining; characteristics; cleaning and finishing; heat treatment; present and future uses; and weldability. Tables, graphs, and illustrations. (Ti)

112-V. The Precious Metals. *Materials & Methods,* v. 35, May 1952, p. 133, 135.

Data sheets cover Au, Ag, Pt, Pd, Rh, Ru, Os, and Ir with respect to physical and mechanical properties, fabrication, corrosion resistance, available forms, and uses. (EG-c)

113-V. The Spring Steels, Their Development, Properties and Applications. (In German.) Sepp Ammareller. *Stahl und Eisen,* v. 72, Apr. 24, 1952, p. 475-488; disc., p. 488-489.

Results of scaling tests and alternating-stress tests. Effects of surface finish, corrosion, and cross section of specimen were studied. Manufacture, heat treatment, and applications of the springs. Graphs, diagrams, and tables. 30 ref. (T7, AY, SG-b)

114-V. What We Know About Titanium. P. G. DeHuff and W. S. Hazelton. *Aviation Week,* v. 56, June 2, 1952, p. 40-41, 44-46.

Brief discussion of Ti and its alloys in relation to use in the aircraft industry, giving data on mechanical properties, forging, machining, and welding.
(T24, Q general, F22, G17, K general, Ti)

115-V. Rare Earths Are Moving Into Industry. *Business Week,* May 31, 1952, p. 46, 50-51.

Improved properties obtained in numerous cases upon addition of rare earths to standard alloy and stainless steels. (EG-g, SS, AY)

116-V. Ductile Iron. Its Significance to the Foundry Industry. Albert P. Gagnebin. *Foundry,* v. 80, June 1952, p. 128-131, 226-230, 232-240.

Manufacture, properties, and applications; economic prospects. Tables, graphs, and photographs. 14 ref. (E general, A4, CI)

117-V. Extremely High Temperature Materials. Bernard P. Planner. *Western Metals,* v. 10, May 1952, p. 43-45.

Various properties; manufacturing techniques, especially that of powder metallurgy; applications;

composition of ceramic-metal materials; and ceramic-coatings on metal. (H general, L27, SG-h)

118-V. Results of New Investigations in the Field of High-Melting Metallic Hard Materials: Carbides, Nitrides, Borides, and Silicides. (In German.) R. Kieffer and F. Benesovsky. *Metall,* v. 6, Apr. 1952, p. 171-176.

Methods of production, properties, systems, and technical applications on the basis of the literature. Tables and graphs. 51 ref. (C-n, SG-j)

119-V. Aluminium and Its Alloys. R. W. Berriman. *Australasian Engineer.* Mar. 7, 1952, p. 76-82.

Trends in the metallurgy of Al wrought and cast products. Compositions of the principal wrought and casting alloys, showing their relationship to general alloy characteristics. Phase relationships of alloying elements, and some properties of high-strength alloys, clad products, high-temperature alloys, and casting alloys. Thermal treatments. Graphs and tables. 20 ref. (Al, SG-h, f, k, c)

120-V. Guide for Selecting Tool Steels and Carbides. *Steel,* v. 130, June 16, 1952. p. S1-S32.

A directory listing more than 50 companies and their products. Includes index of materials by trade name and index of materials by companies. Latter gives primary application, type, analysis, quenching medium, machinability, and movement in hardening. (TS, C-n)

121-V. (Book) **Tool Steel Handbook.** 197 pages. 1951. Allegheny Ludlum Steel Corp., 2020 Oliver Bldg., Pittsburgh 22, Pa. Free.

Charts and tables give specific and comparative data on properties, analyses, and applications of this company's toolsteels. Descriptions of the important grades, and forms and finishes available. Heat treating and handling techniques and other useful reference material. (TS)

122-V. (Book) **Metallurgiia Legkikh Metallov.** (Metallurgy of Light Metals.) Ed. 3. A. I. Beliaev. 428 pages. 1949. Government Scientific-Technical Publishing House for Literature on Ferrous and Nonferrous Metallurgy, Moscow, U.S.S.R.

Extractive metallurgy of the most important light metals—Al, Mg, Be, Ca, Ba, and Li. Properties, fields of application, technology of production, and theoretical bases of production. Tables, graphs, and diagrams. 121 ref.
(C general, Al, Mg, Be, Ca, Ba, Li)

123-V. Some Facts About Gallium: Frenchman Reviews Present Knowledge. *Chemical Age,* v. 66, Apr. 5, 1952, p. 515-516. (Translated and condensed from *Chimie et Industrie,* v. 67, Jan. 1952, p. 45-55.)
(Ga)

124-V. New at B.I.F. 1952: Titanium. *Light Metals,* v. 15, June 1952, p. 192-194.

Exhibit at British Industries Fair. General discussion of Ti and its various properties, stressing corrosion resistance. Large photographic chart shows the relative resistance to corrosion of Ti and other constructional metals. Map shows world distribution of Ti ore deposits.
(R general, B10, Ti)

125-V. Magnesium Alloys. F. A. Fox. *Magnesium Review and Abstracts,* v. 8, Apr. 1952, p. 156-164.

Previously abstracted from *Research.* See item 52-V, 1952. (Mg)

126-V. High Strength Aluminium Alloys. C. Wilson. *Metal Industry,* v. 80, May 23, 1952, p. 419-421; May 30, 1952, p. 445-449.

May 23 issue: Heat treatment, corrosion and extrusion. May 30: Effects of solution and precipitation treatments on mechanical properties. Photographs, tables, and graphs. (Al)

127-V. Non-Magnetic Steel. C. T. Eakin. *Electrical Manufacturing,* v. 50, July 1952, p. 108-112, 268, 270, 272.

Information of four types of alloys available for electrical design. Basic metallurgy responsible for nonmagnetic properties, and various processes and properties. Alloy types are Cr-Ni; C-Mn-Ni; and C-Mn steels; and C-Ni cast irons.
(T1, AY, CI)

128-V. Engineering Properties and Applications of S.G. Iron. A. B. Everest. *Engineer,* v. 193, June 13, 1952, p. 794-795; June 20, 1952, p. 838-840.

Refers to "spheroidal-graphite" or nodular cast iron. Summarizes the latest information on these new irons in engineering practice. Various modifications of the material have been developed. Tables, graphs, and micrographs. 35 ref. (CI)

129-V. Titanium: Big Production Gains. Charles A. Scarlott. *Steel,* v. 130, June 30, 1952, p. 76-79.

General discussion of Ti; mechanical and physical properties, corrosion resistance, applications, etc. Ore reduction of Ti from rutile, and production and fabrication of the metal. (Ti)

130-V. Boron Steels Studied. *Steel,* v. 130, June 30, 1952, p. 93, 96.

Research is shifting from the study of mechanical properties to study of specific properties and ap-

plications. These include fundamental research. A list of projects recommended for future investigation. (AY)

131-V. The Rise of Titanium. *Westinghouse Engineer*, v. 12, July 1952, p. 114-117.

A survey covering various properties, processes, and applications. (Ti)

132-V. Titanium at Work in Jet Engines. P. G. DeHuff and W. S. Hazelton. *Westinghouse Engineer*, v. 12, July 1952, p. 118-120.

See abstract of "What We Know About Titanium", *Aviation Week;* item 114-V, 1952.
(T24, Q general, F22, G17, K general, Ti)

133-V. (French.) **Utilization of Tungsten.** Ch. More. *Métallurgie et la Construction mécanique*, v. 84, May 1952, p. 315, 317-318.

A review on the basis of the literature, particularly the manufacture and use of tungsten carbides, and other possibilities of utilization. 28 ref. (W, C-n)

134-V. (German.) **New Results of Research on High-Melting Metallic Hard Metals.** (Continued.) R. Kieffer and F. Benesovsky. *Metall*, v. 6, May 1952, p. 243-250

Reviews literature data on borides and silicides. Their production, phase relationships, and technical applications. Tables, charts, and micrographs. 57 ref. (B, Si, SG-j)

135-V. Choosing Alternate Steels. H. B. Knowlton. *Machine Design*, v. 24, July 1952, p. 217-218, 220, 222, 224.

See abstract of "An Investigation of Boron and Other Low-Alloy Steels." *Steel Processing;* items 59-V and 104-V, 1952. (AY)

136-V. (Book). **Titanium Metal and Its Future.** 103 pages. 1952. Harvard Business School, Cambridge, Mass.

A group project by nine 2nd-year students at the Harvard Graduate School of Business Administration. The information was obtained from three major sources: published material appearing in company and government literature, statistical reports, and magazine articles; personal discussion with some of the Ti producers and research organizations; correspondence with other Ti producers and potential consumers of Ti. Covers history, properties, alloys, ores, processing, melting, forming, fabricating, and the industry today and in the future. Includes short selected bibliography. (Ti)

137-V. (Book). **Tungsten: A Treatise on Its Metallurgy, Properties and Applications. Ed. 3.** C. J. Smithells, editor. 320 pages. Chapman and Hall, Ltd., 37 Essex St., London W.C. 2, England. 75s. net.

Second edition was published 15 years ago. Most of the chapters have been rewritten by experts in various aspects of the subject. (W)

138-V. Some Methods of Preparation, Properties and Applications of Tungsten. D. J. Jones. *Alloy Metals Review*, v. 8, June 1952, p. 2-7.

A review. Tables and graphs. 14 ref. (W)

139-V. Nickel Conservation Research Announced by Alloy Casting Institute. Harold Schor. *Industrial Heating*, v. 19, July 1952, p. 1234, 1236.

Research done at Battelle on development of a heat resistant material of lower alloy content than the high-Ni alloys frequently used in 900-1400° F. service. This work was incorporated into later studies which resulted in a method of Ni and Cr conservation in heat resistant castings.
(E general, CI, Ni, SG-h)

140-V. Titanium Today. R. S. Radcliffe. *Ordnance*, v. 37, July-Aug. 1952, p. 166-168.

Production, properties, fabrication, and applications. (Ti)

141-V. Magnesium Goes Automotive *SAE Journal*, v. 60, July 1952, p. 47-53. (Excerpts from "New Applications and Developments of Magnesium Alloys in Automotive Industry," by J. D. Hanawalt and G. K. Glaza.)

Progress report on fabricating methods for Mg. Die casting, machining, electroplating, forming and drawing, impact extrusion, and joining. Automotive applications.
(E13, G general, L17, K general, T21, Mg)

142-V. (French.) **High Speed Steels.** Claude Vouga. *Revue de Métallurgie*, v. 49, June 1952, p. 393-407.

History, structure and application, and general metallurgical aspects. Tables give standard compositions. Micrographs. 20 ref. (S22, TS)

143-V. (German.) **Gallium.** H. O. Nicolaus. *Metall*, v. 6, July 1952, p. 374-376.

Production, properties, and applications. Table contains physical properties and structural data. (Ga)

144-V. Wide Range Uses Seen for New Alloy. *Inco Magazine*, v. 25, no. 3, 1952, p. 13-14.

Cemented Cr carbide has good properties and conserves critical elements at same time. (Cr, C-n)

145-V. A Survey of High-Temperature Materials. J. M. Robertson. *Metal Treatment and Drop Forging,* v. 19, July 1952, p. 303-312.

Alloys used in steam and gas-turbine plants operating in the 450-950° C. range, with attendant problems of both ferritic, austenitic steels and other alloys. Compositions of 43 alloys in 9 groups tabulated. (SS, SG-h)

146-V. Tantalum. J. Lomas. *Mine & Quarry Engineering,* v. 18, Aug. 1952, p. 245-247.

Resources, production, properties, and applications. (Ta)

147-V. Chrome Carbide Provides High Corrosion Resistance. J. D. Kennedy. *Steel,* v. 131, Aug. 4, 1952, p. 92-94.

Properties and applications of new powder-metallurgy product. Corrosion resistance, mechanical and physical properties, and applications. (Cr, C-n)

148-V. Some Hints on Fabricating Titanium. Thomas A. Dickinson, *Steel Processing,* v. 38, July 1952, p. 333-334, 339.

Brief treatment of the above, including forging, stamping, machining, forming, welding, heat treatment, brazing, etc. Tables give mechanical, physical properties. (Ti)

149-V. Element XXIII. Laurence Critchell, *Steelways,* v. 8, July 1952, p. 8-11.

Vanadium, its resources, production, use in steelmaking as ferrovanadium, and as an alloying element in steel. (V, AY, Fe-n)

150-V. (Book) **Gmelins Handbuch der anorganischen Chemie. A4.14. Magnesium.** (Gmelin's Handbook of Inorganic Chemistry. Pt. A4, Sec. 14. Magnesium.) 336 pages. 1952. Verlag Chemie, GMBH., Hauptstrasse 127, Weinheim Bergstr., Germany. $23.81.

Completes the Gmelin Mg volume. Covers binary and ternary alloys from Mg-Zn to Mg-Re as well as surface treatment of Mg and Mg alloys. 31 binary and 105 Mg alloy systems of higher order are treated giving phase diagrams, data on intermetallic compounds, production processes, casting methods, structural data, hardening characteristics, as well as crystallographic, thermic, optical, electric, magnetic and electrochemical properties. Chemical behavior and corrosion resistance. Many surface-treatment processes and methods used by the industry. Includes chemical and electrochemical treatment methods, metallic coatings, and other surface treatments. (Mg)

151-V. (Book) **Gmelins Handbuch der anorganischen Chemie. System-Nummer 41. Titan.** (Gmelin's Handbook of Inorganic Chemistry. System Number 41. Titanium). Ed. 8. 480 pages. 1951. Verlag Chemie G.m.b.H., Hauptstrasse 127, Weinheim-Bergstr., Germany. (Available from Walter J. Johnson, Inc., 125 East 23rd St., New York City, or Stechert-Hafner, Inc. 31 East 10th St., New York City.) $27.20.

Comprehensive reference volume on history, occurrence, extraction, physical properties, chemical behavior and alloys of Ti. The literature referred to comprises papers published as late as Dec. 1949. (Ti)

152-V. New High-Temperature Alloys. A. R. Edwards. *Australasian Engineer,* June 7, 1952, p. 42-47.

Present and possible future developments in addition of Cr, Mo, and W to Fe, Ni, or Co-base alloys. Fundamental metallurgical factors involved. 29 ref. (SG-h, Fe, Ni, Co)

153-V. New High Temperature Alloy. *Materials & Methods,* v. 36, Aug. 1952, p. 98-99.

Mechanical and fabrication properties and applications of Hastelloy X, a new alloy which contains no cobalt. Nominal composition is 45 Ni, 22 Cr, 9 Mo, 0.15 C, and 24 Fe. Tables and graphs. (Ni, SG-h)

154-V. Tool Steels: Uses, Types, Treatments. T. C. DuMond. *Materials & Methods,* v. 36, Aug. 1952, p. 113-128.

Special report covers classes of toolsteels, factors in selecting proper toolsteel, and heating and heat treatment procedures. (TS)

155-V. Magnesia From Sea Water. W. C. Gilpin and N. Heasman. *Refractories Journal,* July 1952, p. 302-307.

Increasing demand and applications for Mg and its compounds, chemistry and practical procedures and equipment, the sea-water process, and refractory problems associated with this process. (C23, Mg)

156-V. Powder Metallurgy and Its Techniques Applied to the Manufacture of Materials for Extremely High Temperatures. Bernard P. Planner. *Western Machinery and Steel World,* v. 43, June 1952, p. 105, 117-118; July 1952, p. 83-85, 97; Aug. 1952, p. 93-95, 107.

See abstract of "Extremely High Temperature Materials", *Western Metals;* item 117-V, 1952. (H general, L27, SG-h)

157-V. (English.) **The Use of Boron in Special Steels.** *Aciers fins et spéciaux Francais,* June 1952, p. 34-38.

Resources, characteristics, applications, development and production

of boron steels, rolling, forging, heat treatment, fabrication, microstructure, analysis, etc. (AY, B)

158-V. Titanium—the New Metal. George P. Michalos. *Bureau of Ships Journal*, v. 1, Sept. 1952, p. 7-14.

Origin, properties, uses, and potential value especially in ships and submarines. Illustrations and tables. (T22, Ti)

159-V. The Use of Austenitic Manganese Steel. J. Lomas. *Machinery Lloyd* (Overseas Ed.), v. 24, Aug. 16, 1952, p. 77-79.

Principal facts are assembled, including history, standard austenitic Mn steels, properties, addition of Ni, heat treatment, and applications. (AY)

160-V. The American Society for Testing Materials Looks at the Metal Tin. Bruce W. Gonser. *Metal Progress*, v. 62, Sept. 1952, p. 72-75.

Economic status and future prospects for tin. Resources and methods of recovery of the metal, use as a coating in the container industry, as a solder in automobile-body construction, and methods of analysis for impurities. (SN)

161-V. Substitution of Straight Chromium Stainless Steels for Chromium-Nickel Types. John Parina, Jr. *Metal Progress*, v. 62, Sept. 1952, p. 97-114.

A series of brief articles as follows: "Established Uses of Straight Chromium Stainless Steels", F. K. Bloom; "N.P.A. Regulation M-80 Lists Many Approved Uses for Chromium Stainless", G. A. Sands; "Limited Uses of Type 400 Steels Laid to Lack of Incentives", Elmer Gammeter; "Urges Wider Use of Chromium Stainless Alloys", E. C. Wright; "Many Uses Where Corrosive Conditions Are Not Severe", R. Hunter; "Substitutions Based on Knowledge of Metal and Applications Are Successful", D. W. Kaufman; "Fabricating Difficulties Being Overcome", W. F. Hodges; and "Successful Fabrication Depends on Correct Technique", C. B. Tupholme. Section on "Welding and Brazing" includes: "Three Factors Affect Weldability of Chromium-Iron Alloys", M. C. T. Bystram and W. I. Pumphrey; "Fabrication Techniques for Type 430 Stainless", M. E. Carruthers; and "Deep Drawing Techniques for Reduced Fabricating Costs", E. Von Hambach. Section headed "Aircraft Industry Takes a Cautious Attitude" covers "Aircraft Maker Collecting Data on Service Life", A. E. Leach; "Polish and Plate to Prevent Development of Rust", J. W. Sweet; and "High Corrosion Resistance of Chromized Coatings", T. P. Hoar. "420 and 431 in British Engines" covers "Use for Compressor Blades" by C. A. Dalton. Section on "Welded and Seamless Tubing—Properties and Applications" includes: "Some Rules for Using Tubular Products of 400 Series", H. D. Newell; "Type 430 Welded Tubing, Stabilized With Titanium", V. W. Whitmer and J. S. Adelson; "High-Temperature Properties of Ferritic Stainless Tubing", A. B. Wilder; and "Applications for Straight Chromium Stainless Tubing", J. A. Deitrich. Section on "Chromium-Iron Castings" includes: "Substitution of 18-8 Types With Straight Chromium Alloys for Castings", R. J. Wilcox; and "2% Ni is Good for High Chromium-Iron Alloys", Harvey T. Harrison. Section on "The Chemical Industry Can Extend Applications" covers "Chemical Industry's Experience is Reasonably Satisfactory", L. R. Honnaker; "Does Not Contaminate Mildly Corrosive Solutions", M. H. Brown; and "Gives Adequate Service in Nitric Acid and Ammonia Plants", R. A. Byorum. (T general, SS)

162-V. Aluminum Alloys of High Modulus. *Metal Progress*, v. 62, Sept. 1952, p. 142, 144. (Condensed from "Development of Aluminum Alloys Having a High Young's Modulus", G. Meikle, J. Thompson, and M. E. Whilans, *Royal Aircraft Establishment*, Technical Note Met-149, Aug. 1951.)

(Al)

163-V. The Metallurgy of Zirconium; Its Extraction, Fabrication, and Properties. A. D. Merriman. *Metal Treatment and Drop Forging*, v. 19, Aug. 1952, p. 365-371.

Methods of extraction and properties of Zr. Present uses and future potentialities which are limited by high cost and difficulty of extraction. (To be continued.) (Zr)

164-V. Cadmium. J. Lomas. *Mine & Quarry Engineering*, v. 18, Sept. 1952, p. 291-293.

Origin, properties, and practical applications. (Cd)

165-V. Columbium—Rarest Jet Metal. Frank H. Cothay. *Mining World*, v. 14, Sept. 1952, p. 44-47.

A survey in reference to Nigerian deposits, electrostatic and air separation, concentrate specifications, strength at high temperatures, and importance in high alloys. (Cb)

166-V. The Technology of Titanium. R. I. Jaffee and J. M. Blocher, Jr. *Modern Metals*, v. 8, Aug. 1952, p. 62, 64, 66, 68. (Condensed from article in

v. 4, "Resources for Freedom", report by the President's Materials Policy Commission.)

Problem of extraction; two leading economic processes (Kroll and iodide process); fabrication problem; special attributes of Ti; high-temperature Ti alloys; military applications; substitution and competitive factors. (Ti)

167-V. The Rare Earths and Their Future. Clyde Williams. *Monthly Business Review,* (Federal Reserve Bank of Cleveland), v. 34, Sept. 1952, p. 11.

The 14 metals in the "rare-earth" group of the periodic table—their separation, processing, and present and potential applications. (T general, EG-g)

168-V. (German.) Technical Magnesium Alloys and Aluminum Alloys Containing Magnesium. Gustav Siebel. *Zeitschrift für Metallkunde,* v. 43, July 1952, p. 238-244.

Comprehensive report on research and development work done at I. G. Farbenindustrie, A.G., Bitterfeld, Germany. 132 ref. (Mg, Al)

169-V. Boron-Treated Steels. *Iron & Steel,* v. 25, Sept. 1952, p. 412, 418.

Production of boron steels for the purpose of saving substantial quantities of Ni, Cr, and Mo. (AY)

170-V. Titanium Carbide: a New Heat-Resistant Lightweight Material. Benjamin L. Hummel. *Machine Design,* v. 24, Sept. 1952, p. 139-144.

Properties, processes, applications, and future developments. (Ti, C-n)

171-V. Copper-Clad Aluminium. *Metal Industry,* v. 81, Aug. 29, 1952, p. 163-165.

Mechanical and physical properties tabulated. Information on soldering; welding; forming; annealing; and applications, especially electrical. (T1, Al)

172-V. Beryllium Alloys in Engineering. Walter Deisinger. 4th International Mechanical Engineering Congress, June 1952, 9 pages.

Historical development; mechanical and physical properties of pure Be, and of Cu-Be, Ni-Be, and some other Be alloys; and applications. Constitution diagram for CuBe. Tables, graphs, and photographs. (Be, Cu, Ni)

173-V. The Engineering Properties and Applications of Spheroidal Graphite Cast Iron. A. B. Everest. 4th International Mechanical Congress, June 1952, 23 pages.

Summarizes latest information. Includes tables and text on mechanical and physical properties; production characteristics including machinability and weldability; modifications, including alloyed structures and surface heat treatment; hot and cold working; service properties. Illustrated. 23 ref. (CI)

174-V. (Book.) Antimony. Ed. 3. C. Y. Wang. 170 pages. 1952. Charles Griffin & Co., Ltd., London. 25s.

In order to confine treatment to essential phases, former chapters on history, chemistry, mineralogy, and analysis have been eliminated. Topics covered are geology of antimony, metallurgy of antimony, industrial uses, and economics. Bibliographies, tables, graphs, and diagrams. (Sb)

175-V. (Book.) Lead in Modern Industry. 230 pages. Lead Industries Association, 420 Lexington Ave., New York 7, N. Y. $1.50.

History of lead, production from mine to refined metal, fabrication techniques. Uses, including storage batteries, cable sheathing, chemical construction, plumbing, architecture, radiation protection, coatings, bearing metals, ammunition. Corrosion resistance and joining techniques. Manufacture, applications and properties of industrial lead compounds. (Pb)

176-V. (Book.) Republic Enduro Stainless Steels. 485 pages. 1951. Republic Steel Corp., Republic Bldg., Cleveland.

Development, types, properties, fabrication, heat treatment, microstructures, transformations, available forms, maintenance, applications, corrosion resistance. Numerous tables, graphs, and illustrations. (SS)

177-V. (Book.) Symposia on Materials and Design for Light-Weight Construction: The Magnesium Symposium. *Engineer Research and Development Laboratories* (Fort Belvoir, Va.), 1951, 64 pages. $2.00. (Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C.

Six papers on various aspects presented Feb. 9, 1951. (Separately abstracted.) (Mg)

178-V. Electrolytic Manganese Acceptance Grows. C. L. Mantell. *Iron Age,* v. 170, Sept. 18, 1952, p. 168-172.

Present status of electrolytic Mn, 99.97% pure. Chemical analysis, production, physical properties, allotropism and transition points, properties of alloys, and applications. It is supplied as a cathode chip. 11 ref. (Mn)

179-V. S. G. Cast Irons; Notes on the Properties and Uses of an Important Material. *Automobile Engineer,* v. 42, Sept. 1952, p. 338-340.

See abstract of "The Engineering Properties and Applications of Spheroidal Graphite Cast Iron," A.

B. Everest, 4th International Mechanical Engineering Congress, June 1952; item 173-V, 1952. (CI)

180-V. Titanium. *British Steelmaker*, v. 18, Sept. 1952, p. 456-458.

History, production, machining and welding, and prospects. (Ti)

181-V. Tantalum Goes Chemical. *Chemical Engineering*, v. 59, Sept. 1952, p. 252, 254.

Availability, cost, applications, processing, and properties. (Ta)

182-V. New Elektron Magnesium-Zirconium-Zinc-Thorium Casting Alloy ZT1. *Light Metals*, v. 15, Sept. 1952, p. 305-306.

Mechanical properties of above alloy for use at temperatures above 300° C. It is used in sand castings for jet engines. Corrosion resistance, castability, and heat treatment. (Q general, T25, general, E25, J general, Mg)

183-V. Carbon and Low Alloy Steel Castings. Philip O'Keefe. *Materials & Methods*, v. 36, Sept. 1952, p. 119-134.

Properties, specifications, design, joining, heat treating, and inspection. Photographs, tables, and diagrams. (CI)

184-V. Beryllium Alloys in Engineering. Walter Deisinger. *Metal Industry*, v. 81, Sept. 12, 1952, p. 203-205.

See abstract, 4th International Mechanical Engineering Congress, June 1952, item 172-V, 1952. (Be, Cu, Ni)

185-V. Characteristics and Applications of Capped and Rimmed Steels. H. H. Smith. *Wire and Wire Products*, v. 27, Sept. 1952, p. 874-877.

Production, uses, composition, and some mention of welding and plating aspects. (ST)

186-V. How to Understand Brass. Samuel Storchheim. *American Machinist*, v. 96, Oct. 13, 1952, p. 151-156.

Basic metallurgy of brass alloys. Includes constitution, heat treatment, mechanical properties, and corrosion resistance. (M general, J general, Q general, R general, Cu)

187-V. Aluminum Alloys. Harry W. Fritts. *Industrial and Engineering Chemistry*, v. 44, Oct. 1952, p. 2289-2292.

Annual construction-material review. New applications in chemical and petrochemical industries and additional information on resistance to corrosion of aluminum alloys by a number of chemicals. 76 ref. (T29, R general, Al)

188-V. Nickel and Nickel-Base Alloys. H. O. Teeple. *Industrial and Engineering Chemistry*, v. 44, Oct. 1952, p. 2325-2338.

Annual construction-materials review. Composition of alloys, properties of alloys, magnetic properties, high-temperature properties, fabrication including welding, mechanical forming and coating, and applications. 293 ref. (Ni)

189-V. Stainless Steels and Other Ferrous Alloys. Walter A. Luce. *Industrial and Engineering Chemistry*, v. 44, Oct. 1952, p. 2346-2359.

Annual construction-materials review. Corrosion, heat resistance, physical and mechanical properties, welding, and other fabrication means and typical applications. 287 ref. (SS, Fe)

190-V. Less Common Metals. L. F. Yntema and Wilfred R. Bekebrede. *Industrial and Engineering Chemistry*, v. 44, Oct. 1952, p 2364-2370.

Review of past year's literature on Ta, Ti, Zr, Mo, and the noble metals as construction materials. Properties and applications. 148 ref. (Ta, Ti, Zr, Mo, EG-c)

191-V. Metals for Tomorrow. *Iron Age*, v. 170, Oct. 9, 1952, p. 259-290.

Series of articles on Ce, Ge, Li, Mo, Se, Si, V, Ti, and Zr designed to answer such questions as what is their availability; what are their properties and prospects; where can they be obtained and at what price? Except for Ti the articles are brief and are complete revisions, by the staff of Battelle Memorial Institute, of earlier compilations. The article on Ti is separately abstracted. (A4, T general, EG-d, g)

192-V. Titanium—Our No. 1 Problem. Parts I and II. D. I. Brown. *Iron Age*, v. 170, Oct. 9, 1952, p. 260-279; Oct. 16, 1952, p. 105-113.

Part I: Experimental applications; fabricating methods; forging practice; welding techniques; and machining methods. Economics and a description of the modified Mg reduction process for Ti. Part II: Sources of ore, melting techniques, and casting by skull melting. Tables, diagrams, graphs, photographs, and photomicrographs. Bibliography. (Ti)

193-V. Moly Based Metal Ceramic Designed for High Temperature Use. *Iron Age*, v. 170, Oct. 16, 1952, p. 114.

Physical and mechanical properties. Known as D-1922, and developed by P. R. Mallory & Co., it is a hybrid incorporating Mo disilicide and suitable ceramic components. Potential uses are surveyed. (T general, P general, Q general, Mo, SG-h)

194-V. Materials in Design. *Machine Design*, v. 24, Oct. 1952, p. 125-160.

"Copper-Base Alloys", D. K. Crampton; "Titanium Alloys", Her-

bert A. Jahnle and Warren S. Hazelton; "Boron Steels", H. B. Knowlton; "Rubber and Synthetics", Karl P. Goodwin; "Magnesium Alloys", James V. Winkler; "Powder Metals", Robert Talmage; "Plastics", John Delmonte; "Aluminum Alloys", John R. Willard; "Corrosion Resistant Materials", Howard T. Francis; and "Heat Resistant Alloys", Roger A. Long.
(T general, R general, Cu, Al, Ti, Mg, AY, SG-g, h)

195-V. General Purpose High Temperature Alloys: What They Can Do, Where to Use Them. Kenneth Rose. *Materials & Methods,* v. 36, Oct. 1952, p. 103-107.

Carbon steels, low and high-alloy steels, stainless steels, and nickel-base alloys. Mechanical properties and corrosion resistance. (T general, Q general, R general, CN, AY, SS, Ni, SG-h)

196-V. Manganese-Silicon and Manganese - Nickel - Chromium - Molybdenum Steels. *Materials & Methods,* v. 36, Sept. 1952, p. 139.

Materials data sheet on AISI Types 9255, 9261, 9440, and 9450 steels. Physical and mechanical properties, heat treatment, fabricating properties, corrosion resistance, available forms, and uses. (AY)

197-V. The Metallurgy of Zirconium. Its Extraction, Fabrication and Properties. (Concluded.) A. D. Merriman. *Metal Treatment and Drop Forging,* v. 19, Sept. 1952, p. 413-417.

Workability of Zr metal. Corrosion properties and potentialities of Zr as an alloying element. Some present-day applications. 23 ref. (Zr)

198-V. (Book.) **The Magnesium Symposium.** 64 pages. PB 106 332, Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. $2.00.

A handbook on industrial application of magnesium alloys. Contains report of a symposium held at Army's Engineer Research and Development Laboratories (Fort Belvoir) in cooperation with Magnesium Assn. (T general, Mg)

199-V. (Book.) **Aluminiumguss in Sand und Kokille.** (Sand and Die-Cast Aluminum Castings.) Ed. 5. Roland Irmann. 300 pages. Verlag der Aluminium-Zentrale E. V., 31 Alleestrasse, Düsseldorf, Germany. Bound, 30.60 D.M., paper backed, 28.20 D.M.

Raw materials; Al and alloys; smelting of swarf; silicon alloys, gas porosity, volume changes, melting practice, casting foundry practice, die-casting, cleaning, anodizing, heat treatment, inspection, and welding. (E11, E13, Al)

200-V. Chromium-Vanadium Steels. *Materials & Methods,* v. 35, Apr. 1952, p. 139.

A data sheet. Compositions, physical and mechanical properties, thermal treatments, formability, machinability, weldability, corrosion resistance, available forms, and uses. (AY)

201-V. Metallurgical Problems of Nuclear Reactors. H. M. Finniston. *Research,* v. 5, Oct. 1952, p. 456-463.

Extraction, manufacture, and properties of U, Pu, Th, Be, and Zr; the problem of irradiation as it may affect the properties of the reactor materials; and corrosion problems of reactors. Micrographs and tables. (T25, P13, EG-h, U, Pu, Th, Be, Zr)

202-V. The Technology of Tin. Bruce W. Gonser. "Resources for Freedom. Vol. IV. The Promise of Technology" (U. S. Govt. Printing Office, Washington), 1952, p. 55-63.

Purpose of report is to aid in evaluating technological position of tin and to foresee technical developments which may affect its uses in next 25 years. Sources, elimination of waste, substitutes, and new uses. 13 ref. (B10, T general, Sn)

203-V. The Technology of Zirconium. Robert I. Jaffee and Ivor E. Campbell. "Resources for Freedom Vol IV. The Promise of Technology" (U. S. Govt. Printing Office, Washington), 1952, p. 83-93.

Production problems, new processes, means of improving performance—largely with respect to corrosion resistance and mechanical properties, present and potential applications, and future prospects. (Zr)

204-V. The Technology of Uncommon Metals. Bruce W. Gonser and others. "Resources for Freedom. Vol. IV. The Promise of Technology" (U. S. Govt. Printing Office, Washington), 1952, p. 95-114.

Each metal or group of metals is discussed briefly to show its probable future technological development and how it may affect supply or usefulness of other metals. Includes sections on alkali metals, alkaline-earth metals, antimony, arsenic, bismuth, boron, cadmium, gallium, germanium, hafnium, indium, mercury, platinum-group metals, rhenium, selenium, silicon, tellurium, thallium, thorium, cerium and other rare earths. 57 ref. (EG-b, c, e, g)

205-V. Germanium, Produced as a Byproduct, Has Become of Primary Importance. A. P. Thompson and J. R. Musgrave. *Journal of Metals,* v. 4, Nov. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 1132-1137.

Early history, occurrence, recovery, purification, and uses of Ge. Photographs and diagrams. 30 ref. (Ge)

206-V. Molybdenum. J. Lomas. *Mine & Quarry Engineering*, v. 18, Nov. 1952, p. 351-353.

Resources, production, properties, and applications. (Mo)

207-V. Zirconium. A. D. Merriman. *Sheet Metal Industries*, v. 29, Nov. 1952, p. 1003-1005, 1008.

Effects of O_2 and N_2 on hardness of Zr, factors influencing cold and hot workability, effects of reduction processes on mechanical properties of Zr, chemical corrosion resistance, machinability, weldability, alloy compositions, and applications. (Zr)

208-V. Copper in Stainless Steels. Helmut Thielsch. *Welding Research Council*, Bulletin Series 9, Aug. 1951, 31 pages.

Physical, metallurgical and welding properties of Cu-bearing stainless steels containing up to 30% Cr and between 0 and 35% Ni. Phase relations, hot working properties, corrosion resistance, age hardening characteristics, effects of Mn, Si, Mo, Cb, Ti, W, Be, V, etc. Detailed tables list the various patented and commercial alloys. Micrographs and graphs. 166 ref. (SS)

209-V. (Book.) **Titanium Metal and Its Future.** R. M. Burston, C. D. Crosby, G. A. Goetz, W. M. Minkler, Fred Nadherny, G. P. Little, G. J. Sella, W. W. Sherrill, and J. M. Wermuth. 100 pages. 1952. Graduate School of Business Administration, Harvard University, Cambridge, Mass. $10.00.

Objective view of the latest titanium developments for the nontechnician. Properties of metal, its alloys, ores, melting and forming, and fabrication are dealt with in the chapter on basic products. Companies producing titanium today, experiments in progress, market, and current production costs. Future of Ti in terms of processing and costs, alloys, markets, applications, competition, and location of the industry. Drawings, charts, and tables. (A4, Ti)

ADDRESSES OF PUBLICATIONS

1. ENGLISH LANGUAGE JOURNALS

A

Acoustical Society of America, Journal, American Institute of Physics, Prince and Lemon Sts., Lancaster, Pa.

Acta Chemica Scandinavica (mostly English), Messrs. Ejnar Munksgaard, Norregade 6, Copenhagen, Denmark.

Acta Crystallographica (mostly English), Messrs. Ejnar Munksgaard, Norregade 6, Copenhagen, Denmark, or American Institute of Physics, 57 E. 55th St., New York 22, N. Y.

Advances in Physics, Taylor & Francis, Ltd., Red Lion Court, Fleet St., London E. C. 4, England.

Aero Digest, Aeronautical Digest Publishing Corp., 515 Madison Ave., New York 22, N. Y.

Aeronautical Engineering Review, Institute of Aeronautical Sciences, 2 E. 64th St., New York 21, N. Y.

Aeronautical Quarterly, Royal Aeronautical Society, 4 Hamilton Place, London W. 1, England.

Aeroplane, Temple Press Ltd., Bowling Green Lane, London E. C. 1, England.

Aircraft Engineering, Bunhill Publications, Ltd., 12 Bloomsbury Square, London, W. C. 1, England.

Aircraft Production, Iliffe & Sons, Ltd., Dorset House, Stamford St., London S. E. 1, England.

Alloy Metals Review, High Speed Steel Alloys, Ltd., Widnes, Lancashire, England.

A.M.A. Archives of Industrial Hygiene and Occupational Medicine, American Medical Association, 535 N. Dearborn St., Chicago 10, Ill.

American Ceramic Society, Bulletin, 2525 N. High St., Columbus 2, Ohio.

American Ceramic Society, Journal, 2525 N. High St., Columbus 2, Ohio.

American Chemical Society, Journal, 1155 16th St., N. W., Washington 6, D. C.

American Concrete Institute, Journal, 18263 W. McNichols Rd., Detroit 19, Mich.

American Concrete Institute, Proceedings, 18263 W. McNichols Rd., Detroit 19, Mich.

American Foundryman, American Foundrymen's Society, 616 S. Michigan Ave., Chicago 5, Ill.

American Foundrymen's Society, Transactions, 616 S. Michigan Ave., Chicago 5, Ill.

American Gas Association, Proceedings, American Bldg., Brattleboro, Vt., or 420 Lexington Ave., New York 17, N. Y.

American Gas Journal, American Gas Journal, Inc., 205 E. 42 St., New York 17, N. Y.

American Institute of Electrical Engineers, Transactions, 33 W. 39th St., New York 18, N. Y.

American Institute of Mining and Metallurgical Engineers, Transactions, 29 W. 39th St., New York 18, N. Y.

American Institute of Mining and Metallurgical Engineers, Proceedings National Open Hearth Committee, Iron and Steel Division, 29 W. 39th St., New York 18, N. Y.

American Institute of Mining and Metallurgical Engineers, Proceedings, Blast Furnace, Coke Oven, and Raw Materials Committee, Iron and Steel Division, 29 W. 39th St., New York 18, N. Y.

American Journal of Physics, American Institute of Physics, Prince and Lemon Sts., Lancaster, Pa.; or 57 E. 55th St., New York 22, N. Y.

American Lumberman & Building Products Merchandiser, American Lumberman, Inc., 139 N. Clark St., Chicago 2, Ill.

American Machinist, McGraw-Hill Bldg., 330 W. 42nd St., New York 36, N. Y.

American Medical Association Archives of Industrial Hygiene and Occupational Medicine, American Medical Association, 535 N. Dearborn St., Chicago 10, Ill.

American Mineralogist, Dr. Earl Ingerson, U. S. Geological Survey, Washington, 25, D. C.

American Paint Journal, 3713 Washington Avenue, St. Louis 8, Mo.

American Pressman, International Printing Pressmen and Assistants' Union of North America, Pressmen's Home, Tenn.

American Printer, 48 W. 38th St., New York 18, N. Y.

American Railway Engineering Association, Bulletin, 59 E. Van Buren St., Chicago 5, Ill.

American Rocket Society, Journal, Engineering Societies Bldg., 29 W. 39th St., New York 18, N. Y.

American Scientist, 54 Hillhouse Ave., New Haven, Conn.

American Society of Mechanical Engineers, Transactions, 29 W. 39th St., New York 18, N. Y.

American Society for Metals, Transactions, 7301 Euclid Ave., Cleveland 3, Ohio.

American Society of Naval Engineers, Journal, 605 F. St., N. W., Washington 4, D. C.

American Society for Testing Materials, Bulletin, (see ASTM Bulletin).

American Society for Testing Materials, Proceedings, 1916 Race St., Philadelphia 3, Pa.

American Waterworks Association, Journal, 521 5th Ave., New York 17, N. Y.

American Zinc Institute, Journal, 60 E. 42nd St., New York 17, N. Y.

Analytica Chimica Acta, Elsevier Press, Inc., 300 Park Ave., New York, N. Y.

Analyst, F. L. Okell, Editor, Society of Public Analysts and Other Analytical Chemists, 7-8, Idol Lane, London, E. C. 3, England.

Analysts Journal, Helen Slade, managing editor, 400 E. 57th St., New York 22, N. Y.

Analytical Chemistry, American Chemical Society, 1155 16th St., N. W., Washington 6, D. C.

Applied Chemistry, Journal, Society of Chemical Industry, 56 Victoria St., London, S. W. 1, England.

Applied Mechanics Reviews, American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N. Y.

Applied Scientific Research, Martinus Nighoff, The Hague, Netherlands.

Architectural Forum, Time Inc., Time and Life Bldg., 9 Rockefeller Plaza, New York 20, N. Y.

Arkiv for Fysik (mostly English), Almquist and Wiksells Boktryckeri AB, Stockholm, Sweden.

ASTM Bulletin, American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

Australasian Engineer, 20 Loftus St., Sydney, Australia.

Australasian Institute of Mining and Metallurgy, Proceedings, Osborne House, 399 Little Collins St., Melbourne, Australia.

Australian Journal of Applied Science, Commonwealth Scientific and Industrial Research Organization, 314 Albert St., East Melbourne C. 2, Victoria, Australia.

Australian Journal of Scientific Research, Commonwealth Scientific and Industrial Research Organization, 314 Albert St., East Melbourne C. 2, Victoria, Australia.

Automobile Engineer, Iliffe & Sons, Ltd., Dorset House, Stamford St., London S. E. 1, England.

Automotive Industries, Chilton Co., Chestnut and 56th Sts., Philadelphia 39, Pa.

Aviation Age, 205 E. 42nd St., New York 17, N. Y.

Aviation Week, McGraw-Hill Publishing Co., 330 W. 42nd St., New York 36, N. Y.

B

Bakelite Review, Bakelite Review - 243, 30 E. 42nd St., New York 17, N. Y.

Battelle Technical Review, Battelle Memorial Institute, 505 King Ave., Columbus 1, Ohio.

Bell Laboratories Record, Bell Telephone Laboratories, Inc., 463 West St., New York 14, N. Y.

Bell System Technical Journal, American Telephone and Telegraph Co., 195 Broadway, New York 7, N. Y.

Better Enameling, Chicago Vitreous Enamel Product Co., 1427 S. 55th Court, Cicero 50, Ill.

Birmingham Metallurgical Society, Journal, 253 Longbridge Lane, Northfield, Birmingham 31, England.

Blast Furnace, Coke Oven, and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings, 29 W. 39th St., New York 18, N. Y.

Blast Furnace and Steel Plant, Steel Publications, Inc. Osceola Mills, Pa.

British Cast Iron Research Association Journal of Research and Development, Alvechurch, Birmingham, England.

British Clayworker, 23 Tavistock St., London, W. C. 2, England.
British Journal of Applied Physics, Institute of Physics, 47 Belgrave Square, London S. W. 1, England.
British Printer, Maclean Hunter, 2-4 Cockspur St., London S. W. 1, England.
British Steelmaker, 7, Chesterfield Gardens, Mayfair, London W. 1, England.
Brown Boveri Review, Brown Boveri Co., Ltd., Baden, Switzerland.
Bulletin of the Institute of Metals, (bound with Journal of the Institute of Metals), Institute of Metals, 4 Grosvenor Gardens, London S. W. 1, England.
Bulletin of the Institution of Mining and Metallurgy, Salisbury House, Finsbury Circus, London E. C. 2, England.
Bulletin of the Society of Economic Geologists, (see Economic Geology and the Bulletin of the Society of Economic Geologists).
Bureau of Ships Journal, Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.
Business Week, McGraw-Hill Publishing Co., 330 W. 42nd St., New York 35, N. Y.

C

Canadian Chemical Processing, 137 Wellington St., West, Toronto, Ontario, Canada.
Canadian Institute of Mining and Metallurgy, Transactions (see Canadian Mining and Metallurgical Bulletin).
Canadian Journal of Chemistry, Administrative Services, National Research Council of Canada, Ottawa, Ontario, Canada.
Canadian Journal of Physics, Administrative Services, National Research Council of Canada, Ottawa, Ontario, Canada.
Canadian Journal of Technology, Administrative Services, National Research Council of Canada, Ottawa, Ontario, Canada.
Canadian Metals, Westman Publications, Ltd., 137 Wellington St., West, Toronto, Ontario, Canada.
Canadian Mining Journal, National Business Publications, Ltd., Gardenvale, Quebec, Canada.
Canadian Mining and Metallurgical Bulletin, Canadian Institute of Mining and Metallurgy, 911 Drummond Bldg., Montreal, Quebec, Canada.
Casting Research Laboratory, Report, (Japan) (In English), Waseda University, Tokyo, Japan.
Ceramic Age, Ceramics Publishing Co., 421 Parker St., Newark 4, N. J.
Ceramic Industry, Industrial Publications, Inc., 5 S. Wabash Ave., Chicago 3, Ill.
Ceramics, Arrow Press, Ltd., 157 Hagden Lane, Watford, Herts, England.
Chemical Age, Bouverie House, 154 Fleet St., London E. C. 4, England.
Chemical Engineering, McGraw-Hill Publishing Co., 330 W. 42nd St., New York 18, N. Y.
Chemical and Engineering News, American Chemical Society, 1155 16th St., N. W., Washington 6, D. C.
Chemical Engineering Progress, American Institute of Chemical Engineers, 120 E. 41st St., New York 17, N. Y.; or 15 N. 7th St., Philadelphia 6, Pa.
Chemical Industries (see Chemical Week).
Chemical Industries Week (see Chemical Week).
Chemical, Metallurgical and Mining Society of South Africa, Journal, Kelvin House, Marshall and Hollard Sts., Johannesburg, South Africa.
Chemical & Process Engineering, Leonard Hill Ltd., Stratford House, 9 Eden St., London, N. W. 1, England.
Chemical Processing, Putnam Publishing Co., 111 E. Delaware Pl., Chicago 11, Ill.
Chemical Society, Journal, Burlington House, London W. 1, England.
Chemical Week, McGraw-Hill Publishing Co., 330 W. 42nd St., New York 36, N. Y.
Chemist, American Institute of Chemists, 60 E. 42nd St., New York 17, N. Y.
Chemist Analyst, J. T. Baker Chemical Company, Phillipsburg, N. J.
Chemistry, Editorial Office, 1719 North St., N. W., Washington 6, D. C.
Chemistry & Industry, Society of Chemical Industry, 56 Victoria St., London S. W. 1, England.
Chemistry in Canada, Consolidated Press Ltd., 73 Richmond St., W., Toronto, Canada.
Civil Engineering, American Society of Civil Engineers, 33 W. 39th St., New York, N. Y.
Coal Age, McGraw-Hill Publishing Co., 330 W. 42nd St., New York 36, N. Y.
Coke and Gas, Tothill Press, Ltd., 33 Tothill St., Westminster, London S. W. 1, England.

Combustion, Combustion Publishing Co., 200 Madison Ave., New York 16, N. Y.
Compressed Air Magazine, Phillipsburg, N. J.
Corrosion, National Association of Corrosion Engineers, 1061 M & M Building, No. 1 Main St., Houston 2, Tex.

D

Die Castings (see Precision Metal Molding).
Diesel Power and Diesel Transportation, Diesel Publications, Inc., 192 Lexington Ave., New York 16, N. Y.
Discussions of the Faraday Society. (See Faraday Society, Discussions).
Draht (Wire) (English Ed.), Prost and Meiner - Verlag, (13a) Corburg /Ofr., Bahnofstrasse 31, Germany.
Drilling, Associated Publishers, Inc., 2115 N. St. Paul St., Dallas 1, Tex.

E

Economic Geology and the Bulletin of the Society of Economic Geologists, Urbana, Ill.
Edgar Allen News, Edgar Allen & Co., Ltd., Imperial Steel Works, Sheffield 9, England.
Edison Electric Institute Bulletin, 420 Lexington Ave., New York 17, N. Y.
Electrical Communication, International Telephone and Telegraph Corp., 67 Broad St., New York 4, N. Y.
Electrical Engineering, American Institute of Electrical Engineers, 33 W. 39th St., New York 18, N. Y.
Electrical Manufacturing, Gage Publishing Co., 1250 6th Ave., New York 20, New York.
Electrical World, McGraw-Hill Publishing Co., 330 W. 42nd St., New York 36, N. Y.
Electric Light and Power, Harwood Publishing Co., 22 E. Huron St., Chicago 11.
Electrochemical Society, Journal, 235 W. 102nd St., New York 25, N. Y.
Electrodepositors' Technical Society, Journal, 27 Islington High St., London N. 1, England.
Electronic Engineering, 28 Essex St., Strand, London W. C. 2, England.
Electronics, McGraw-Hill Publishing Co., 330 W. 42nd St., New York 36, N. Y.
Electroplating and Metal Finishing, 83-85 Udney Park Rd., Teddington, Middlesex, England.
Electroplating and Metal Spraying, 83-85, Udney Park Rd., Teddington, Middlesex, England.
Engineer, 28 Essex St., Strand, London, W. C. 2, England.
Engineering, 35-36 Bedford St., Strand, London W. C. 2, England.
Engineering Experiment Station News (see Ohio State University Engineering Experiment News).
Engineering and Mining Journal, McGraw-Hill Publishing Co., 330 W. 42nd St., New York 36, N. Y.
Engineering News-Record, McGraw-Hill Publishing Co., 330 W. 42nd St., New York 36, N. Y.
Engineers' Digest, 120 Wigmore St., London W. 1, England; or 366 Madison Ave., New York 17, N. Y.
Escher Wyss News, Escher Wyss Ltd., Zurich, Switzerland.

F

Factory Management and Maintenance, McGraw-Hill Publishing Co., 330 W. 42nd St., New York 36, N. Y.
Faraday Society, Discussions, 6 Gray's Inn Sq., London W. C. 1, England; or Aberdeen Univ. Press, Ltd., 6 Upper Kirkgate, Aberdeen, Scotland.
Faraday Society, Transactions, 6 Gray's Inn Square, London W. C. 1, England; or Aberdeen Univ. Press, Ltd., 6 Upper Kirkgate, Aberdeen, Scotland.
Fibreboard Containers and Paperboard Mills, Board Products Publishing Co., 228 N. LaSalle St., Chicago 1, Ill.
Finish, Dana Chase Publications, 360 N. Michigan Ave., Chicago 1, Ill.
Flow Basic Monthly, Flow Magazine, 1240 Ontario St., Cleveland 13, Ohio.
Food Engineering, 99-129 N. Broadway, Albany 1, N. Y.; or 330 W. 42nd St., New York 36, N. Y.
Foote Prints, Foote Mineral Co., 18 W. Chelten Ave., Philadelphia 44, Pa.
Fortune, Time, Inc., 540 N. Michigan Ave., Chicago 11, Ill.
Foundry, Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio.
Foundry Trade Journal, 49 Wellington St., London W. C. 2, England.
Franklin Institute, Journal, Franklin Institute of the State of Pennsylvania, Prince and Lemon St., Lancaster, Pa.; or Benjamin Franklin Parkway at 20th St., Philadelphia 3, Pa.

Furniture Manufacturer, Vincent Edwards & Co., 342 Madison Ave., New York 17, N. Y.

G

Gas Age, Moore Publishing Co., Emmett St., Bristol, Conn.
Gas Journal, Norman S. Smith, Editor, 11, Bolt Court, Fleet St., London E. C. 4, England.
Gas Times, Arrow Press Ltd., 157 Hagden Lane, Watford, Herts., England.
Gas World, Bouverie House, Fleet Street, London E. C. 4, England.
General Electric Review, Editor, General Electric Review, Schenectady 5, N. Y.
Geographical Review, American Geographical Society, Broadway at 156th St., New York 32, N. Y.
Graphic Arts Monthly, Graphic Arts Publishing Co., 608 S. Dearborn Ave., Chicago 5, Ill.

H

Heating, Piping, and Air Conditioning, Keeney Publishing Co., 6 N. Michigan Ave., Chicago 2, Ill.
Heating and Ventilating, The Industrial Press, 148 Lafayette St., New York 13, N. Y.

I

Inco Magazine, International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.
Indian Institute of Science, 23 B. Netaji Subhas Rd., Calcutta 1, India.
India Rubber Journal, Stafford House, Norfolk St., London, W. C. 2, England.
India Rubber World, Bill Brothers Publishing Corp., 386 Fourth Ave., New York 16, N. Y.
Industrial Chemist, (see Industrial Chemist and Chemical Manufacturer).
Industrial Chemist and Chemical Manufacturer, 33 Tothill St., Westminister, London S. W. 1, England.
Industrial Diamond Review, N. A. G. Press, Ltd., 226 Latymer Court, Hammersmith, London W. 6, England.
Industrial and Engineering Chemistry, American Chemical Society, 1155 16th St., N. W., Washington 6, D. C.
Industrial Finishing, Practical Publications, Inc., 1142 N. Meridian St., Indianapolis 4, Ind.
Industrial Gas, Moore Publishing Co., 48 W. 38th St., New York 18, N. Y.
Industrial Gas, (London) (See Gas World).
Industrial Heating, National Industrial Publishing Co., Union Trust Bldg., Pittsburgh 19, Pa.
Industrial Waste Conference, Proceedings, Purdue University, Lafayette, Ind.
Industry and Power, Maujer Publishing Co., 420 Main St., St. Joseph, Mich.
Industry & Welding, Industrial Publishing Co., 1240 Ontario St., Cleveland 13, Ohio.
Inland Printer, Maclean-Hunter Publishing Corp., 309 W. Jackson Blvd., Chicago 6, Ill.
Institute of British Foundrymen, Proceedings, St. John St., Chambers, Deansgate, Manchester 3, England.
Institute of Fuel, Journal, 18 Devonshire St., London W. 1, England.
Institute of Metals, Bulletin, Institute of Metals, 4 Grosvenor Gardens, London S. W. 1, England.
Institute of Metals, Journal, 4 Grosvenor Gardens, London S. W. 1, England.
Institute of Petroleum, Journal, 26 Portland Pl., London W. 1., England.
Institute of Radio Engineers, Proceedings, 1 E. 79th St., New York 21, N. Y.
Institute Spokesman, National Lubricating Grease Institute, 4638 J. C. Nichols Pkwy, Kansas City 2, Mo.
Institute of Welding, Transactions, 2 Buckingham Palace Gardens, London S. W. 1, England.
Institution of Electrical Engineers, Proceedings, Savoy Place, London W. C. 2, England.
Institution of Engineers and Shipbuilders in Scotland, Transactions, 151 Elmbank Crescent, Glasgow C. 2, Scotland.
Institution of Mechanical Engineers, Proceedings, Storey's Gate, St. James Park, London S. W. 1, England.
Institution of Mining and Metallurgy, Bulleton, Salisbury House, Finsbury Circus, London E. C. 2, England.
Institution of Mining and Metallurgy, Transactions, Salisbury House, Finsbury Circus, London E. C. 2, England.
Instrumentation, Minneapolis - Honeywell Regulator Co., Wayne and Windrim Aves., Philadelphia 44, Pa.
Instrument Society of America, Journal, (See I.S.A. Journal).
Instruments, Instruments Publishing Co., 921 Ridge Ave., Pittsburgh 12, Pa.

International Chemical Engineering and Process Industries, Leonard Hill, Ltd., 11 Stratford Place, London, W. 1, England; or British Publications, Inc., 150 E. 35th St., New York 16, N. Y.

Iron Age, 100 E. 42nd St., New York 17, N. Y.

Iron and Steel, Louis Cassier Co., Ltd., Dorset House, Stamford St., London S. E. 1, England.

Iron and Steel Engineer, Association of Iron and Steel Engineers, 1010 Empire Bldg., Pittsburgh 22, Pa.

Iron and Steel Institute, Journal, 4 Grosvenor Gardens, London S. W. 1, England.

I.S.A. Journal, (bound with Instruments), Instruments Publishing Co., 921 Ridge Ave., Pittsburgh 12, Pa.

J

Japan Science Review (English), Association for Science Documents Information, Tokyo Institute of Technology Onokayama, Meguro-ko, Tokyo, Japan.

Journal of the Acoustical Society of America, American Institute of Physics, Prince and Lemon Sts., Lancaster, Pa.; or 57 East 55th St., New York 22, N. Y.

Journal of the Aeronautical Sciences, Institute of the Aeronautical Sciences, Inc., 2 East 64th St., New York 21, N. Y.

Journal of the American Ceramic Society, 2525 N. High St., Columbus 2, Ohio.

Journal of the American Chemical Society, 1155-16th St., N. W., Washington 6, D. C.

Journal of the American Concrete Institute, 18263 W. McNichols Rd., Detroit 19, Mich.

Journal of the American Rocket Society, Helen Slade, Managing editor, 400 E. 57th St., New York 22, N. Y.

Journal of the American Society of Naval Engineers, 605 F. St., N. W., Washington 4, D. C.

Journal, American Waterworks Association, 521 5th Ave., New York 17, N. Y.

Journal, American Zinc Institute, 60 E. 42nd St., New York 17, N. Y.

Journal of Applied Chemistry, Society of Chemical Industry, 56 Victoria St., London S. W. 1, England.

Journal of Applied Mechanics, American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N. Y.

Journal of Applied Physics, American Institute of Physics, 57 E. 55th St., New York 22, N. Y.

Journal of the Birmingham Metallurgical Society, 253 Longbridge Lane, Northfield, Birmingham 31, England.

Journal of Chemical Education, 20th and Northampton Sts., Easton, Pa.

Journal of the Chemical, Metallurgical, and Mining Society of South Africa, Kelvin House, Marshall and Hollard Sts., Johannesburg, South Africa.

Journal of Chemical Physics, American Institute of Physics, 57 E. 55th St., New York 22, N. Y.

Journal of the Chemical Society, Burlington House, London W. 1, England.

Journal of Colloid Science, Academic Press, Inc., 125 E. 23rd St., New York 10, N. Y.

Journal of the Electrochemical Society, 235 W. 102nd St., New York 25, N. Y.

Journal of the Electrodepositors' Technical Society, 27 Islington, London, N. 1, England.

Journal of the Franklin Institute, Franklin Institute of the State of Pennsylvania, Prince and Lemon Sts., Lancaster, Pa.; or Benjamin Franklin Parkway at 20th St., Philadelphia 3, Pa.

Journal of the Institute of Fuel, 18 Devonshire St., London W. 1, England.

Journal of the Institute of Metals, 4 Grosvenor Gardens, London S. W. 1, England.

Journal of the Institute of Petroleum, 26 Portland Place, London W. 1, England.

Journal of the Iron and Steel Institute, 4 Grosvenor Gardens, London S. W. 1, England.

Journal of Metals, American Institute of Mining and Metallurgical Engineers, Inc., 29 W. 39th St., New York 18, N. Y.

Journal of the Oil & Colour Chemists' Association, R. H. Hamblin, General Secretary, Memorial Hall, Farringdon Street, London E. C. 4, England.

Journal of the Optical Society of America, American Institute of Physics, 57 E. 55th St., New York 22, N. Y.

Journal of Physical Chemistry, American Chemical Society, 1155 Sixteenth St., N. W., Washington 6, D. C.

Journal of Research of the National Bureau of Standards, Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Journal of Scientific & Industrial Research, The Assistant Secretary, (Publications), 20 Pusa Road, New Delhi 5, India.

Journal of Scientific Instruments, Institute of Physics, 47 Belgrave Square, London S. W. 1, England.

Journal of the Society of Motion Picture and Television Engineers, 342 Madison Ave., New York 17, N. Y.

Journal of the Society of Naval Engineers, American Society of Naval Engineers, Inc., 605 F. St., N. W., Washington 4, D. C.

Journal of Southern Research, Southeastern Research Institute, 5009 Peachtree Rd, Atlanta, Ga.

L

Laboratory Practice, United Trade Press, Ltd., 24 Bride Lane, Fleet St., London E. C. 4, England.

Lead Industries Association, Proceedings, 420 Lexington Ave., New York 17, N. Y.

Light Metal Age, 220 S. State St., Chicago 4, Ill.

Light Metals, Temple Press, Ltd., Bowling Green Lane, London E. C. 1, England.

Linde Tips and Oxy-Acetylene Tips, Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

Lubrication, The Texas Co., 135 E. 42nd St., New York 17, N. Y.

Lubrication Engineering, American Society of Lubrication Engineers, 343 S. Dearborn St., Chicago 4, Ill.

M

Machine Design, Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio.

Machine and Tool Blue Book, Hitchcock Publishing Co., 222 E. Willow Ave., Wheaton, Ill.

Machinery (American), Industrial Press, 148 Lafayette St., New York 13, N. Y.

Machinery (London), Machinery Publishing Co., Ltd., National House, West St., Brighton 1, England.

Machinery Lloyd, (Overseas Edition), 6 Cavendish Place, Regent St., London W. 1, England.

Magazine of Magnesium, Brooks & Perkins, Inc., 1950 W. Fort St., Detroit 16, Mich.

Magazine of Tooling and Production (formerly Tool and Die Journal), 1975 Lee Rd., Cleveland 18, Ohio.

Magnesium Review and Abstracts, Magnesium Elektron Ltd., Clifton Junction, NR. Manchester, England.

Mainspring, Associated Spring Corporation, Bristol, Conn.

Manufacturers Record, 109 Market Place, Baltimore 3, Md.

Marine Engineering and Shipping Review, 30 Church St., New York 7, N. Y.

Materials & Methods, Reinhold Publishing Corp., 330 W. 42nd St., New York 36, N. Y.

Mechanical Engineering, American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N. Y.

Mechanical Handling, Louis Cassier Co. Ltd., Dorset House, Stamford St., London S. E. 1, England.

Memoirs of the Faculty of Engineering, Kyoto University, Kyoto University, Kyoto, Japan.

Metal Age, Metal Information Bureau Ltd., Birkett House, 27 Albemarle St., London W. 1, England.

Metal Bulletin, Metal Information Bureau Ltd., Birkett House, 27 Albemarle St., London W. 1, England.

Metal Finishing, Finishing Publications, Inc., 381 Broadway, Westwood, N. J.

Metal Industry, Louis Cassier Co., Ltd., Dorset House, Stamford St., London S. E. 1, England.

Metallurgia, Kennedy Press, Ltd., 31 King St., West, Manchester 3, England.

Metal Powder Association, Powder Metallurgy, Ltd., 59/62 High Holborn, London W. C. 1, England.

Metal Progress, American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

Metal Treating, Metal Treating Institute, 271 North Ave., New Rochelle, N. Y.

Metal Treatment and Drop Forging, 49 Wellington St., Strand, London W. C. 2, England.

Metals, Atlas Publishing Co., 425 W. 25th St., New York 1, N Y.

Metals Review, American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

Microtecnic (English Edition), Lausanne, Switzerland.

Midwest Engineer, Western Society of Engineers, 84 E. Randolph St., Chicago 1, Ill.

Mine & Quarry Engineering, Electrical Press Ltd., 23 Great Queen St., London W. C. 2, England.

Mineral Industries, School of Mineral Industries, Pennsylvania State College, State College, Pa.

Mines Magazine, Colorado School of Mines Alumni Assn., Robert E. Hancock, Secretary, 734 Cooper Bldg., Denver, Colo.

Mining Congress Journal, American Mining Congress, 1102 Ring Bldg., Washington 6, D. C.
Mining Engineering, American Institute of Mining and Metallurgical Engineers, 29 W. 39th St., New York 18, N. Y.
Mining Journal, Mining Journal Ltd., 15, George St., London E. C. 4, England.
Mining Magazine, Mining Publications, Ltd., Salisbury House, London E. C. 2, England.
Mining World, American Trade Journals, Inc., 121 2nd St., San Francisco 5, California.
Modern Industrial Press, Andreson, Inc., Windsor Manor, P. O. Box 687, Pittsburgh 30, Pa.
Modern Industry, Magazine of Industry, Inc., 400 Madison Ave., New York 17, N. Y.
Modern Lithography, Industry Publications, Inc., 175 Fifth Ave., New York 10, N. Y.
Modern Machine Shop, Gardner Publications, Inc., 431 Main St., Cincinnati 2, Ohio.
Modern Metals, Modern Metals Publishing Co., 435 N. Michigan Ave., Chicago 11, Ill.
Modern Packaging, Modern Packaging Corp., 575 Madison Ave., New York 22, N. Y.
Modern Plastics, 575 Madison Ave., New York 22, N. Y.
Monthly Business Review, Federal Reserve Bank of Cleveland, Cleveland 1, Ohio.
Murex Limited Review, Murex, Ltd., Rainham, Essex, England.

N

National Bureau of Standards, Journal of Research (see Journal of Research of the National Bureau of Standards).
National Bureau of Standards, Technical News Bulletin, Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.
National Lithographer, National Lithographer Publishing Co., 1 Sherman Ave., Jersey City 7, N. J.
National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, Proceedings, 29 W. 39th St., New York 18, N. Y.
Nature, Macmillan & Co., Ltd., St. Martin's St., London W. C. 2, England.
New Mexico Miner and Prospector, New Mexico Miners & Prospectors Assn., P. O. Box 695, Silver City, New Mex.
Non-Destructive Testing, Society for Non-Destructive Testing, 1109 Hinman Ave., Evanston, Ill.
North East Coast Institution of Engineers & Shipbuilders, Transactions, Newcastle-Upon-Tyne, England.
Nucleonics, McGraw-Hill Publishing Co., 330 W. 42nd St., New York 36, N. Y.

O

Official Digest, Federation of Paint and Varnish Products Clubs, 1524 Chestnut St., Philadelphia 2, Pa.
Ohio Journal of Science, Dr. Richard A. Popham, Botany and Zoology Building, The Ohio State University, Columbus 10, Ohio.
Ohio State University, Engineering Experiment Station News, Columbus 10, Ohio.
Oil & Colour Chemists' Association, Journal, R. H. Hamblin, General Secretary, Memorial Hall, Farringdon St., London E. C. 4, England.
Oil and Gas Journal, Petroleum Publishing Co., 211 S. Cheyenne Ave., Tulsa, Okla.
Optical Society of America, Journal, American Institute of Physics, 57 E. 55th St., New York 22, N. Y.
Ordnance, American Ordnance Assn., 705 Mills Blvd., Washington 6, D. C.
Organic Finishing, Finishing Publications, Inc., 381 Broadway, Westwood, N. J.
Overseas Engineer, Temple Press Ltd., Bowling Green Lane, London E. C. 1, England.

P

Paint Manufacture, Leonard Hill, Ltd., 17 Stratford Place, London W. 1, England.
Paint, Oil & Chemical Review, 1607 Howard St., Chicago 26, Ill.
Paint and Varnish Production, Powell Magazines, Inc., 855 Avenue of the Americas, New York 1, N. Y.
Paint Industry Magazine, 1321 Arch St., Philadelphia 7, Pa.
Paper Trade Journal, Lockwood Trade Journal Co., Inc. 15 W. 47th St., New York 36, N. Y.
Petroleum, Leonard Hill, Ltd., Stratford House, 9 Eden St., London N. W. 1, England.

Petroleum Engineer, Petroleum Engineer Publishing Co., Irwin-Keasler Bldg., Dallas 1, Tex.

Petroleum Processing, National Petroleum Publishing Co., 1213 W. 3rd St., Cleveland 13, Ohio.

Petroleum Refiner, Gulf Publishing Co., Box 2608, Houston 1, Tex.

Philips Technical Review, N. V. Phillips' Gloeilampenfabrieken, Technical and Scientific Literature Dept., Eindhoven, Netherlands.

Philosophical Magazine, Taylor and Francis, Ltd., Red Lion Court, Fleet St., London E. C. 4, England.

Physica, (mostly English), Dr. W. J. Beckman, Treasurer of the Physics Foundation, 6 Bijhouwerstraat Utrecht, Netherlands.

Physical Review, American Institute of Physics, 57 E. 55th St., New York 22, N. Y.

Physical Society, Proceedings, 1 Lowther Gardens, Prince Consort Rd., London S. W. 7, England.

Physics Today, American Institute of Physics, 57 E. 55th St., New York 22, N. Y.

Photographic Journal, Royal Photographic Society of Great Britain, 16 Princess Gate, London S. W. 7, England.

Pipe Line News, Oildom Publishing Co., 1217 Hudson Blvd., Bayonne, N. J.

Pipe Progress, American Cast Iron Pipe Co., Birmingham 2, Ala.

Pit and Quarry, Complete Service Publishing Co., 431 S. Dearborn St., Chicago 5, Ill.

Plastics, Temple Press, Ltd., Bowling Green Lane, London E. C. 1, England.

Plating, American Electroplaters' Society, 5800 N. Marvine St., Philadelphia 41, Pa.

Plating Notes, Defence Research Laboratories, Maribyrnong, Victoria, Australia.

Powder Metallurgy Bulletin, 320 Yonkers Ave., Yonkers 2, N. Y.

Power, McGraw-Hill Publishing Co., 330 W. 42nd St., New York 36, N Y.

Precision Metal Molding, 1240 Ontario St., Cleveland 13, Ohio.

Printing Equipment Engineer, Willsea Publishing Co., 1276 W. 3rd St., Cleveland 13, Ohio.

Proceedings of the American Concrete Institute, 18263 W. McNichols Rd., Detroit 19, Mich.

Proceedings, Blast Furnace, Coke Oven and Raw Materials Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, 29 W. 39th St., New York 18, N. Y.

Proceedings of the Sixth Industrial Waste Conference (see Industrial Waste Conference, Proceedings).

Proceedings of the Institute of British Foundrymen, St. John St., Chambers, Deansgate, Manchester 3, England.

Proceedings of the I.R.E., Institute of Radio Engineers, 1 E. 79th St., New York 21, N. Y.

Proceedings of the National Open Hearth Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers, 29 W. 39th St., New York 18, N. Y.

Proceedings of the Physical Society, 1 Lowther Gardens, Prince Consort Road, London S. W. 7, England.

Proceedings of the Royal Society, Bentley House, London N. W. 1, England; or 32 E. 57th St., New York 22, N. Y.

Proceedings of the Society for Experimental Stress Analysis, Central Square Sta., P. O. Box 168, Cambridge 39, Mass.

Process Engravers' Monthly, Art and Technics, Ltd., 58 Frith St., London W. 1, England.

Product Engineering, McGraw-Hill Publishing Co., 330 W. 42nd St., New York 36, N. Y.

Product Finishing, 4 Ludgate Circus, London E. C. 4, England.

Products Finishing, Gardner Publications, Inc., 431 Main St., Cincinnati 2, Ohio.

Q

Quarterly of Applied Mathematics, Brown University, Providence 12, R. I., or Box 2-W, Richmond, Va.

Quarterly Reviews, The Chemical Society, Burlington House, Piccadilly, London W. 1, England.

R

Radio Communication, (formerly Television Engineering), Publishing House, Great Barrington, Mass.

Radiology, Donald S. Childs, Business Manager, 713 E. Genesee St., Syracuse 2, N. Y.

Railway Engineering and Maintenance, Simmons-Boardman Publishing Corp., 30 Church St., New York 7, N. Y.

Railway Gazette, 33 Tothill St., Westminster, London S. W. 1, England.

Railway Mechanical and Electrical Engineer, Simmons-Boardman Publishing Corp., 30 Church St., New York 7, N. Y.

RCA Review, RCA Laboratories Division, Radio Corporation of America, Princeton, N. J.

Record of Chemical Progress, Friends of the Kresge-Hooker Scientific Library, Wayne University, Detroit 1, Mich.

Refractories Journal, London and Sheffield Publishing Co., Ltd., 7 Chesterfield Gardens, Curzon St., Mayfair, London W. 1, England.

Refrigerating Engineering, American Society of Refrigerating Engineers, 40 W. 40th St., New York 18, N. Y.

Reports of the Casting Research Laboratory, (Japan) (In English), Waseda University, Tokyo, Japan.

Reports on the Progress of Applied Chemistry, Society of Chemical Industry, 56 Victoria St., London S. W. 1, England.

Research, Butterworths Scientific Publications, Ltd., 4-6 Bell Yard, Temple Bar, London W. C. 2, England.

Research Engineer, Georgia Institute of Technology, State Engineering Experiment Station, Atlanta, Ga.

Reviews of Modern Physics, American Institute of Physics, 57 E. 55th St., New York 22, N. Y.

Review of Scientific Instruments, American Institute of Physics, 57 E. 55th St., New York 22, N. Y.

Rock Products, MacLean-Hunter Publishing Corp., 309 W. Jackson Blvd., Chicago 6, Ill.

Royal Society, Proceedings, Cambridge University Press, Bentley House, London N. W. 1, England: or 32 E. 57th St., New York 22, N Y.

Rubber Age and Synthetics, 147 Grosvenor Rd., London S. W. 1, England.

S

SAE Journal, Society of Automotive Engineers, 29 W. 39th St., New York 18, N. Y.

SAE Quarterly Transactions, Society of Automotive Engineers, 29 W. 39th St., New York 18, N. Y.

Science, American Association for the Advancement of Science, 1515 Massachusetts Ave., N. W., Washington 5, D. C.

Science Reports of the Research Institutes, Tohoku University, (in English), Tohoku University, Sendai, Japan.

Scientific American, 2 W. 45th St., New York 36, N. Y.

Screw Machine Engineering, Screw Machine Publishing Co., 65 Broad St., Rochester 14, N. Y.

Sewage and Industrial Wastes, Federation of Sewage and Industrial Wastes Assn., 325 Illinois Bldg., Champaign, Ill.

Sheet Metal Industries, Industrial Newspapers, Ltd., 49 Wellington St., Strand, London W. C. 2, England.

Sheet Metal Worker, Edwin A. Scott Publishing Co., 92 Martling Ave., Tarrytown, N. Y.

Skillings' Mining Review, David N. Skillings, 810 Fidelity Bldg., Duluth 2, Minn.

Soap and Sanitary Chemicals, MacNair-Dorland Co., 254 W. 31st Street, New York 1, N. Y.

Society of Automotive Engineers, Journal, (see SAE Journal).

Society of Economic Geologists, Bulletin (see Economic Geology and the Bulletin of the Society of Economic Geologists).

Society of Motion Picture and Television Engineers, Journal, 342 Madison Ave., New York 17, N. Y.

South African Mining and Engineering Journal, South African Mining Journal Syndicate, Ltd., 201-207 Jubilee House, Simmonds St., Johannesburg, Union of South Africa.

Southern Pulp and Paper Manufacturer, 75 Third St., N. W., Atlanta, Ga.

Spectrochimica Acta, Butterworth-Springer, Ltd., 2, 3, & 5 Studio Place, Kinnerton St., London S. W. 1, England; or Academic Press Inc., 125 E. 23rd St., New York 10, N. Y.

Standardization, American Standards Assn., 70 E. 45th St., New York 17, N. Y.

Steel, Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio.

Steel Equipment & Maintenance News, Box 7997, Pittsburgh 16, Pa.

Steel Horizons, Allegheny Ludlum Steel Corp., Pittsburgh, Pa.

Steel Processing, Steel Publications, Inc., 4 Smithfield St., Pittsburgh 30, Pa.

Steelways, American Iron and Steel Institute, 350 5th Ave., New York 1, N. Y.

Stove Builder, Inst. of Cooking and Heating Appliance Manufacturers, Shoreham Hotel, Washington 8, D. C.

Sulzer Technical Review, Sulzer Brothers Ltd., Winterthur, Switzerland.

Sylvania Technologist, Technical Relations Dept., Sylvania Electric Products, Inc., 40-22 Lawrence St., Flushing, N. Y.

T

Tappi, Technical Association of the Pulp and Paper Industry, 122 E. 42nd St., New York 17, N. Y.

Technical News Bulletin, (National Bureau of Standards), Supt. of Documents, U. S. Government Printing Office, Washington, D. C.

Technology Review, Room 1-281, Massachusetts Institute of Technology, Cambridge 39, Mass.

Tele-Tech, Caldwell-Clements, Inc., 480 Lexington Ave., New York 17, N. Y.

Tele-Vision Engineering, Bryan Davis Publishing Co., 52 Vanderbilt Ave., New York 17, N. Y.

Textile Industries, 806 Peachtree St., Atlanta 5, Ga.

Textile Research Journal, Textile Research Institute, 10 E. 40th St., New York 16, N. Y.

Times Review of the Progress of Science, 640 5th Ave., New York 19, N. Y.

Times Science Review, Subscription Manager, The Times, London, E. C. 4, England.

Tohoku University, Science Reports of the Research Institutes, (in English), Tohoku University, Sendai, Japan.

Tool & Die Journal, Huebner Publications, 1975 Lee Rd., Cleveland 18, Ohio.

Tool Engineer, American Society of Tool Engineers, 10700 Puritan Ave., Detroit 21, Mich.

Tooling and Production, (see Magazine of Tooling and Production).

Transactions of the American Foundrymen's Society, 616 S. Michigan Ave., Chicago 5, Ill.

Transactions of the American Institute of Electrical Engineers, 33 W. 39th St., New York 18, N. Y.

Transactions of the American Institute of Mining and Metallurgical Engineers, 29 W. 39th St., New York 18, N. Y.

Transactions of the American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N. Y.

Transactions of the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

Transactions of the Canadian Institute of Mining and Metallurgy, (see Canadian Mining and Metallurgical Bulletin).

Transactions of the Electrochemical Society, 235 W. 102nd St., New York 25, N. Y. (paging same as Journal; abstracts appear under latter).

Transactions of the Faraday Society, 6 Gray's Inn Square, London W. C. 1, England; or Aberdeen University Press, Ltd., 6 Upper Kirkgate, Aberdeen, Scotland.

Transactions of the Indian Institute of Metals, 23 B. Netaji Subhas Rd., Calcutta, India.

Transactions of the Institute of Welding, 2 Buckingham Palace Gardens, London S. W. 1, England.

Transactions of the Institution of Engineers & Shipbuilders in Scotland; 151 Elmbank Crescent, Glasgow C. 2, Scotland.

Transactions of the Institution of Mining and Metallurgy, Salisbury House, Finsbury Circus, London E. C. 2, England.

Transactions of the North East Coast Institution of Engineers & Shipbuilders, Newcastle-Upon-Tyne, England.

Trend in Engineering at the University of Washington, Engineering Experiment Station, 127 More Hall, University of Washington, Seattle 5, Wash.

U

University of Washington Trend in Engineering, Engineering Experiment Station, 127 More Hall, University of Washington, Seattle 5, Wash.

Utilization, Mechanization, Inc., Munsey Bldg., Washington 4, D. C.

V

Vacuum, W. Edwards & Co., Ltd., Worsley Bridge Rd., Lower Sydenham, London S. E. 26, England.

W

Water and Sewage Works, 22 W. Maple St., Chicago 10, Ill.

Welder, Murex Welding Processes, Ltd., Waltham Cross, Herts, England.

Welding Engineer, 330 W. 42nd St., New York 36, N. Y.

Welding Journal, American Welding Society, 33 W. 39th St., New York 18, N. Y.

Welding & Metal Fabrication, (formerly Welding), Louis Cassier Co., Ltd., Dorset House, Stamford St., London S. E. 1, England.

Welding Research, British Welding Research Association, 29 Park Crescent, London W. 1, England.
West of Scotland Iron and Steel Institute, Journal, 39 Elmbank Crescent, Glasgow, Scotland.
Western Machinery and Steel World, 564 Market St., San Francisco 4, Calif.
Western Metals, 198 S. Alvarado St., Los Angeles 5, Calif.
Western Miner, Gordon Black Publications, Ltd., 505 Metropolitan Bldg., Vancouver 1, B. C. Canada.
Westinghouse Engineer, P. O. Box 2278, 401 Liberty Ave., Pittsburgh 30, Pa.
Wire Industry, 33 Furnival St., London E. C. 4, England.
Wire and Wire Products, Quinn-Brown Publishing Corp., 453 Main St., Stamford, Conn.
Wireless Engineer, Dorset House, Stamford St., London S. E. 1, England.
World Oil, Gulf Publishing Co., 3301 Buffalo Dr., Houston 6, Tex.

II. FOREIGN LANGUAGE PERIODICALS

Most of the foreign journals (except Russian) are available through Stechert-Hafner, Inc., 31 E. 10th St., New York 3, N. Y. The Russian journals can be ordered from Four Continent Book Corp., 38 W. 58th St., New York 16, N. Y.

The addresses listed here follow the style used by the country of origin and also the language of origin, except for the country itself, which is given in English. Exact adherence to the style shown for addressing envelopes will greatly facilitate mail deliveries. In some countries (Germany, Austria, Russia) the name of the city precedes the street address. In these instances the name of the city is underlined to avoid confusion with the street address.

A

Abhandlungen der Braunschweigischen Wissenschaftlichen Gesellschaft
Friedr. Vieweg & Sohn, Verlag
Braunschweig
Germany

Aciers Fins & Spéciaux Francais
La Chambre Syndicale des Producteurs d'Aciers Fins et Spéciaux
12, Rue de Madrid
Paris (VIII^{e})
France

Acta Chemica Scandinavica
Messrs. Ejnar Munksgaard
Nörregade 6
Copenhagen
Denmark

Acta Crystallographica
Messrs. Ejnar Munksgaard
Nörregade 6
Copenhagen
Denmark

Acta Physica Austriaca
Springer-Verlag
Wien I
Mölkerbastei 5
Austria

Alluminio
Istituto Sperimentale dei Metalli Leggeri
Via della Posta 8/10
Milano
Italy

Aluminium
Verlag der Aluminium-Zentrale e.V.
Düsseldorf
Alleestrasse 31
Germany

Aluminium Suisse
A. G. Fachschriften-Verlag & Buchdruckerei
Stauffacherquai 40
Zürich 4
Switzerland

Analytica Chimica Acta
Elsevier Publishing Company
110-112 Spuistraat
Amsterdam-c
The Netherlands

Angewandte Chemie
Verlag Chemie, GmbH.
(17a) Weinheim/Bergstrasse
Pappelalle 3
Germany

Annalen der Physik
Johann Ambrosius Barth
Leipzig C 1
Salomonstr. 18 B
Germany

Archiv für das Eisenhüttenwesen
Verlag Stahleisen GmbH.
Düsseldorf
Breite Strasse 27
Germany

Archiv für Technisches Messen
R. Oldenbourg Verlag
München
Lotzbechstrasse 2b
Germany

Arkiv für Fysik
Almqvist & Wiksells Boktryckeri AB
Stockholm
Sweden

Associação Brasileira de Metais, Boletim
Instituto de Pesquisas Tecnologicas
Praça Cel. Fernando Prestes, 110
Sao Paulo
Brazil

Avtogennoe Delo
Glavkislorod
Moskva, Spartakovskaya 2a
(Moscow, U.S.S.R.)

B

Berg -und Hüttenmännische Monatshefte der Montanistischen Hochschule in Leoben
Springer-Verlag
Wien I
Mölkerbastei 5
Austria

Berichte der Deutschen Keramischen Gesellschaft e.V. und des Vereins Deutscher Emailfachleute e.V.
Deutsche Keramische Gesellschaft e.V. und des Verein Deutscher Emailfachleute e.V.
Bonn-Rh.
Poppelsdorfer Allee 15
Germany

Brennstoff-Wärme-Kraft
Deutscher Ingenieur-Verlag GmbH.
Düsseldorf
Ingenieurhaus, Prinz-Georg-Strasse 77/79
Germany

C

Chaleur & Industrie
Henry Cassan
2, Rue des Tanneries
Paris - XIII^{e}
France

Chemie-Ingenieur-Technik
Verlag Chemie, GmbH.
(17a) Weinheim/Bergstrasse
Pappelallee 3
Germany

Chemische Technik
Verlag Technik
Berlin NW7
Unter den Linden 12
Germany

Chimia
Rascher-Verlag
Zürick
Switzerland

Ciencia y Tecnica de la Soldadura
Instituto de la Soldadura
Goya, 58
Madrid
Spain

Circulaire d'Informations Techniques
Centre de Documentation Siderurgique
6, Rue de Lota
Paris (16^{e})
France

Comptes Rendus hebdomadaires des Sciences de l'Académie des Sciences
Gauthier-Villars
55 quai des Grands-Augustins
Paris (6^{e})
France

D

Doklady Akademii Nauk SSSR
Izdatel'stvo Akademii Nauk SSSR
Moskva
(Moscow, Russia)

Doklady Vsesouiznoi Ordena Lenina Akademii Sel'skokhoziaistvennykh Nauk imeni V. I. Lenina
Gosudarstvennoe Izdatel'stvo Sel'skokhoziaistvennoi Literatury
Moskva
(Moscow, U.S.S.R.)

Draht (Wire) (Eng.Edit.)
Prost & Meiner-Verlag
(13a) Coburg/Ofr
Bahnhofstrasse 31
Germany

E

Elektrichestvo
Gosenergoizdat
Moskva, Shliuzovaia Nab. 10
(Moscow, Russia)

Engenharia, Mineração e Metalurgia
Revista de Mineraçao e Metalurgia Ltda.
Rua Seta de Setembro, 135 - 3.^{o}
Rio de Janeiro
Brazil

Erdöl und Kohle
Industrieverlag von Hernhaussen, Kommanditgesellschaft
Hamburg 11
Rödingsmarkt 24
Germany

Esabs Tidning Svetsaren
Elektriska Svetsningsaktiebolaget
Göteborg 8
Sweden

Experientia
Verlag Birkhäuser AG
Basel 10 (Schweiz)
Elisabethenstrasse 15
(Switzerland)

F

Fonderie
Éditions Techniques des Industries de la Fonderie
12, Avenue Raphaël
Paris - 16e
France

Forschung auf dem Gebiete des Ingenieurwesens
Deutscher Ingenieur-Verlag GmbH.
Düsseldorf
Germany

Fresenius' Zeitschrift für Analytische Chemie
Springer-Verlag
Heidelberg
Neuenheimer Landstrasse 24
Germany

G

Gas -und Wasserfach
R. Oldenbourg-Verlag
München 1
Postfach
Germany

Giesserei
Giesserei-Verlag GmbH.
Düsseldorf
Breite Strasse 27
Germany

Gjuteriet
Floragatan 5, n.b.
Stockholm
Sweden

H

Helvetica Chimica Acta
Schweizerische chemische Gesellschaft
Basel 7
Schweiz
(Switzerland)

Helvetica Physica Acta
Verlag - Birkhauser A.G.
Basel 7
Schweiz
(Switzerland)

Hutnicke Listy
Mučednická 8
Brünn-Zabovřesky
Czechoslovakia

Hutnik
(no publisher given)
Ul. Stavova 19
Katowice
Poland

I

Izvestiia Akademii Nauk SSSR Sect. of Tech. and Chem. Sciences
Kontora "Akademkniga"
Moskva, Bol'shoi Cherkasskii Pereulok Dom 2
(Moscow, U.S.S.R.)

J

Jernkontorets Annaler
Bergsingenjör Einar Ohman
Kungstradgärdsgatan 6
Stockholm C
Sweden

Journal de Chimie Physique et de Physico-Chimie Biologique
Société de Chimie Physique
École Nationale Supérieure de Chimie
11, Rue Pierre-Curie
Paris 5e
France

Journal du Four Électrique et des Industries Électrochimiques
Publications Minières et Métallurgiques
86, Rue Cardinet
Paris (17e)
France

Journal d'Informations Techniques des Industries de la Fonderie
Centre Technique des Industries de la Fonderie
12, av. Raphaël
Paris-16e
France

Journal of Mechanical Laboratory
Government Mechanical Laboratory
Sumiyoshi-cho Suginamiku
Tokyo
Japan

Journal de la Soudure
Stauffacherquai 36
Zürich 1, Switzerland

Journal des Recherches du Centre National de la Recherche Scientifique
Center National de la Recherche Scientifiqu
13, Quai Anatole-France
Paris (VIIe)
France

K

Kolloid Zeitschrift
Verlag Dr. Dietrich Steinkopff
Darmstadt
Holzhofallee 35
Germany

Kungl. Tekniska Högskolans Handlingar
A. B. Henrick Lindstahls Bokhandel i Distribution
Stockholm, Sweden

Kunststoffe
Carl Hanser Zeitschriftenverlag GmbH.
München 27
Leonhard-Eck-Str. 7
Germany

L

Legkaia Promyshlennost
Gizlegprom
Moskva, Kuznetskii Most 22
(Moscow, Russia)

L'Ossature Metallique
Le Centre Belgo-Luxembourgeois d'Information de l'Acier
154, avenue Louise
Bruxelles
Belgium

M

Metalen
Drukkerij-Uitgeverij "De Hofstad"
Scheepmakersstraat 1-3
's-Gravenhage
Netherlands

Metall
Metall-Verlag GmbH.
Berlin-Grunewald
Hubertusallee 18
Germany

Metalloberfläche
Carl Hanser Zeitschriftenverlag GmbH.
München 27
Leonhard-Eck-Strasse 7
Germany

Metallurgia Italiana
Associazione Italiana di Metallurgia
Milano
Via S. Paolo, 10
Italy

Métallurgie et la Construction Mécanique
79, Champs-Elysees
Paris (8^{e})
France

Métaux: Corrosion-Industries
Editions Métaux
32 Rue du Marechal Joffre
St.-Germain-en-Laye (Seine et Oise)
France

Mitteilungen des Chemischen Forschungsinstitutes der Wirtschaft Österreichs
Chemisches Forschungsinstitut der Wirtschaft Osterreichs
Wien III
Lothringerstrasse 16
Austria

Monatshefte für Chemie und verwandte Teile anderer Wissenschaften
Springer-Verlag
Wien I
Mölkerbastei 5
Austria

N

Naturwissenschaften
Springer-Verlag
Berlin W 35
Reichpietschufer 20
Germany

Nippon Kinzoku Gakkai-Si
Japan Institute of Metals
Sendai, Japan

Nucleo
Paseo de Gracia, n.^{o}11, 4^{o}, 4^{a}
Barcelona
Espana
(Spain)

P

Physica
Dr. W. J. Beekman
Treasurer of the Physicist Foundation
Bylhouwerstraat 6
Utrecht, Nederland (Netherlands)

Prace Glownego Instytutu Metalurgii
Glowny Instytutu Metalurgii
Ul. K. Miarki 12/4
Gliwice
Poland

Prikladnaia Matematika i Mekhanika
Prikladnaia Matematika i Mekhanika
Moskva, Leningradskoe Shosse 9
(Moscow, U.S.S.R.)

Pro-Metal
Association Métallurgique S.A.
Metallverband AG.
Berne, Switzerland

Promyshlennaya Energetika
Gosenergoizdat
Moskva, Skliuzovaia Nab. 10
(Moscow, U.S.S.R.)

R

Recueil des Travaux Chimiques des Pays-Bas
Nederlandse Chemische Vereniging
Lange Voorhout 5
's-Gravenhage, Netherlands

Revue de l'Aluminium
77, boulevard Malesherbes
Paris (VIII^{e})
France

Revue Générale des Sciences Pures et Appliquées et Bulletin de la Société Philomathique
Société d'Édition d'Enseignement Supérieur
5, place de la Sorbonne
Paris V^{e}
France

Revue de Metallurgie
Marcelle Bonnevialle
25, Rue de Clichy
Paris (IX^{e})
France

Revue de la Soudure
L'Institut Belge de la Soudure
Rue des Drapiers, 21,
Bruxelles
Belgium

Revue Universelle des Mines, de la Métallurgie,des Travaux Publics, des Sciences et des Arts Appliqués à l'Industrie
L'Association des Ingenieurs Sortis de l'École de Liège
12, Quai Paul Van Hoegaerden
Liège, Belgium

S

Schweissen und Schneiden
Friedr. Vieweg & Sohn
(20b) Braunschweig
Burgplatz 1
Germany

Schweisstechnik
Schweisstechnischen Zentralanstalt
Wien XVIII
Schumanngasse 31
Austria

Schweizer Archiv für Angewandte Wissenschaft und Technik
Buchdruckerei Vogt-Schild AG
Solothurn
Switzerland

Smit Mededelingen
Willem Smit & Co.'s Transformatorenfabriek N.V.
Nijmegen, Netherlands

Société Chimique de France, Bulletin
28, Rue Saint-Dominique
Paris (7^{e})
France

Soudure et Techniques Connexes
Publications de la Soudure Autogène
39, rue d'Amsterdam
Paris (8^{e})
France

Spectrochimica Acta
Pergamon Press Ltd.
2, 3, and 5 Studio Place
Kinnerton Street
London S. W. 1, England

Sprechsaal für Keramik: Glas: Email
Verlag Sprechsaal, Müller & Schmidt
Coburg
Mauer 2
Germany

Stahl und Eisen
Verlag Stahleisen GmbH.
Düsseldorf
Breite Strasse 27 (Schliessfach 2590)
Germany

Stanki i Instrument
Gosudarstvennoe Nauchno-Teckhnicheskoe Izdatel'stvo Mashinostroitel'noi Literatury
Moskva
(Moscow, U.S.S.R.)

Steklo i Keramika
Promstroiizdat
Ministerstva Promyshlennosti Stroitel'nykh Materialov SSSR
Moskva
(Moscow, U.S.S.R.)

T

Technik
Verlag Technik GmbH.
Berlin NW7
Unter den Linden 12
Germany

Tecnica Metalurgica
La Asociacion Tecnica Espanola de Estudios Metalurgicos
Paseo de Gracia, 50
Barcelona, Espana
(Spain)

TNO Nieuws
Fa A. H. Krugt
Goothertoginnelaan 28
Bussum, Netherlands

U

Uspekhi Fizicheskikh Nauk
Gosudarstvennoe Izdatel'stvo Teckhniko-Teoreticheskoi Literatury
Moskva
(Moscow, U.S.S.R.)

V

Vestnik Akademii Nauk SSSR
Izdatel'stvo Akademii Nauk SSSR
Moskva
(Moscow, U.S.S.R.)

Vide
Société Française des Ingénieurs Techniciens du Vide
44, Rue de Rennes
Paris (VI^{e})
France

Von Roll Mitteilungen
Vogt-Schild AG.
Solthurn, Switzerland

W

Werkstoffe und Korrosion
Verlag Chemie GmbH.
Weinheim/Bergstrasse
Germany

Z

Za Ekonomiiu Topliva
Glavnoe Upravlenie po Snabzheniu Kamennougol'nym Toplivom
Moskva
(Moscow, U.S.S.R.)

Zapiski Vsesoiuznogo Minerologicheskogo Obshchestva
Izdatel'stvo Akademii Nauk SSSR
Moskva
(Moscow, U.S.S.R.)

Zeitschrift für Angewandte Physik
Springer-Verlag
Berlin W 35
Reichpietschufer 20
Germany

Zeitschrift für Anorganische und Allgemeine Chemie
Johann Ambrosius Barth
Leipzig C 1
Salomonstrasse 18B
Germany

Zeitschrift für Elektrochemie Berichte der Bunsengescellschaft für Physikalische Chemie
Verlag Chemie GmbH.
Weinheim/Bergstrasse
Germany

Zeitschrift für Erzbergbau und Metallhüttenwesen
Dr. Riederer-Verlag GmbH.
Stuttgart S
Marienstr. 50
Germany

Zeitschrift für Metallkunde
Dr. Riederer-Verlag, GmbH.
Stuttgart S
Marienstr. 50
Germany

Zeitschrift für Naturforschung
Verlag der Zeitschrift für Naturforschung
Tübingen
Mathildenstrasse 29
Germany

Zeitschrift für Physik
Springer-Verlag
Berlin W 35
Reichpietschufer 20
Germany

Zietschrift für Physikalische Chemie
Akademische Verlagsgesellschaft Geest & Portig K.-G.
Leipzig C 1
Sternwartenstrasse 8
Germany

Zeitschrift für Schweisstechnik
Stauffacherquai 36
Zürich 1, Switzerland

Zeitschrift des Vereines Deutscher Ingenieure
Deutscher Ingenieur-Verlag GmbH.
Düsseldorf
Prinz-Georg-Str. 77/79
Germany

Zhurnal Obshchei Khimii
Izdatel'stvo Akademii Nauk SSSR
Moskva
(Moscow, U.S.S.R.)

Zhurnal Prikladnoi Khimii
Izdatel'stvo Akademii Nauk SSSR
Moskva
(Moscow, U.S.S.R.)

III. MISCELLANEOUS MATERIAL

A

Acta Polytechnica, Swedish Academy of Engineering Sciences, Stockholm, Sweden.

Aeronautical Research Institute of Sweden, Stockholm, Sweden.

Aeronautical Research Laboratories, Aeronautical Laboratory, Fishermen's Bend, Melbourne, Australia.

Aluminium Development Association, 33 Grosvenor St., London W. 1, England.

American Foundrymen's Society, 616 S. Michigan Ave., Chicago 5, Ill.

American Institute of Mining and Metallurgical Engineers, 29 W. 39th St., New York 18, N. Y.

American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N. Y.

American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

Annals of the New York Academy of Sciences, 2 E. 63rd St., New York 21, N. Y.

Atomic Energy Commission, U. S., Documents Publications Section, Technical Information Service, Oak Ridge, Tenn.

B

British Cast Iron Research Assn., Alvechurch, Birmingham, England.

Bureau of Mines, U. S., Washington 25, D. C.

Bureau of Mines and Geology, State of Montana, Montana School of Mines, Butte, Montana.

C

Canada Dept. of Mines and Technical Surveys, Bureau of Mines, Mines and Geology Branch, Ottawa, Ontario, Canada.

Commonwealth Scientific and Industrial Research Organization, Commonwealth of Australia, Melbourne, Australia.

D

Defence Research Laboratories, Commonwealth of Australia, Finsbury, South Australia

E

Electrodepositors' Technical Society, Northampton St., London E. C. 1, England.

Engineering Experiment Station, (Ohio State University), Columbus 10, Ohio.

Engineering Experiment Station, (University of Illinois), Urbana, Ill.

Engineering Experiment Station, (University of Utah), Salt Lake City, Utah.

F

Franklin Institute, Prince and Lemon Sts., Lancaster, Pa.; or Benjamin Franklin Pkwy. at 20th St., Philadelphia 3, Pa.

G

Geological Survey, U. S., Washington 25, D. C.

H

Her (His) Majesty's Stationery Office, London, England.

I

Illinois State Geological Survey, Urbana, Ill.

Institution of Gas Engineers, 17 Grosvenor Crescent, London S. W. 1, England.

Instituto del Hierro y del Acero, 15 Villanuevo, Madrid, Spain.

Instituto de la Soldadura, Madrid, Spain.

International Nickel Co., 71 Wall St., New York 5, N. Y.

Iron and Steel Institute, 4 Grosvenor Gardens, London S. W. 1, England.

K

Kalgoorlie School of Mines, Kalgoorlie Metallurgical Laboratory, Kalgoorlie, Australia.

M

Massachusetts Institute of Technology, Research Laboratory for Electronics, Cambridge, Mass.

Mines Experiment Station, University of Minnesota, Minneapolis, Minn.

N

National Advisory Committee for Aeronautics, 1724 F. St., N. W., Washington 25, D. C.
National Bureau of Standards, Washington 25, D. C.

O

Office of Technical Services, U. S. Department of Commerce, Washington, D. C.
Ohio State University, Engineering Experiment Station, Columbus 10, Ohio.

R

Research Laboratory for Electronics, Massachusetts Institute for Technology, Cambridge, Mass.

S

State of Montana, Bureau of Mines and Geology, Montana School of Mines, Butte, Montana.
Saab Aircraft Co., Linkoping, Sweden.

T

Technical Information Service, National Research Council, Ottawa, Canada.

U

University of Illinois, Engineering Experiment Station, Urbana, Ill.
University of Melbourne, Mining Department, Melbourne, Australia.
University of Minnesota, Mines Experiment Station, Minneapolis, Minn.
University of Utah, Engineering Experiment Station, Salt Lake City, Utah.
U. S. Atomic Energy Commission (see Atomic Energy Commission).
U. S. Bureau of Mines (see Bureau of Mines).
U. S. Geological Survey (see Geological Survey).
Utah Engineering Experiment Station, University of Utah, Salt Lake City, Utah.

AUTHOR INDEX

Authors' names are indexed by section number and item number rather than by page. The numerals and letters preceding the hyphen refer to the section; the numerals following the hyphen refer to the number of the literature listing.

A

Abbe, Earl H. 90-G
Abcouwer, J. S. 301-E
Abel, L. 132-Q
Abeles, Florin 133-P
Abel's, V. R. 261-P
Aber, W. C. 616-Q
Abgrall, Claude 279-P
Aborn, R. H. 247-K
Abreu, S. Froes 199-B
Abrey, T. E. 172-B
Absalom, J. S. 158-C
Acera, Luis Hurtado 225-Q
Acherman, Walter L. 423-R
Achter, M. R. 125-N
Acker, H. N. 256-J, 659-L
Ackerlind, C. G. 133-E, 427-Q
Adam, G. D. 377-P
Adams, Chester M. 548-T
Adams, E. H. 521-Q
Adams, George B., Jr. 568-P
Adams, Jerry S. 2-G
Adams, J. T., Jr. 15-B
Adams, M. A. 330-Q
Adamson, K. C. 361-E
Adelson, J. S. 161-V
Adenstedt, H. K. 83-V
Agasian, O. N. 159-P
Agey, W. W. 123-B
Agnew, Charles E. 235-B, 56-D, 90-D, 159-D, 199-D, 232-D, 273-D, 288-D
Agruss, B. 16-R
Agte, Curt 84-H
Ahmed, M. S. 478-M
Aigrain, Pierre 526-P
Aikens, R. E. 257-D
Aitken, A. I. 184-D
Aitken, K. L. 533-P
Aka, E. Z. 40-M, 165-M
Akerlind, C. G. 638-Q
Akers, J. B. 139-S
Akimov, G. A. 473-R
Akimov, G. V. 154-P, 189-R, 244-R
Akin, Paul B. 125-D
Akin, William M. 356-D
Akulov, N. S. 133-N, 417-P, 419-P
Albert, Louis 33-T
Albert, Philippe. 454-M, 31-S
Alden, John W. 473-M
Aleksandrov, L. N. 223-N
Alekseev, B. A. 253-E
Albrecht, R. 925-Q
Alden, John W. 473-M
Alemeda, J. M. 867-L
Alers, P. B. 17-B
Aletti, R. 283-P
Alexander, Allen L. 200-L, 913-L
Alexander, B. H. . . . . .59-N, 61-N, ... 89-P, 538-P, 191-Q
Alff, Lucien 35-T
Alison, R. G. 191-K, 309-K
Allan, D. H. W. 489-S
Allan, Walter E. 500-G
Allan, W. J. 513-S, 514-S
Allec, M. 146-T
Allen, A. J. 402-P
Allen, Arthur H. . . . 376-D, 421-G, 57-J
Allen, Edward L. 319-A
Allen, H. 81-A
Allen, J. A. 451-L
Allen, J. F. 93-D, 250-D, 371-D
Allen, N. P. 2-N, 903-Q
Allen, William A. 233-P
Allgood, R. W. 164-A
Allten, A. G. 235-J
Almeida, A. Robert 32-D, 104-D
Almen, J. O. 290-Q
Alov, A. A. 381-K
Althouse, Andrew D. 601-K
Altman, A. R. 101-B
Altman, R. C. 649-Q
Altorfer, H. A. 307-Q
Al'tshuler, S. A. 511-P
Altwicker, H. J. 103-F
Alvarez, F. W. 14-L
Alvarez, M. 822-Q
Alvargonzalez, Jose M. Navarro 65-N
Alverson, Donald 385-E
Alvord, R. D. 822-L
Ambarov, V. A. 730-Q
Amelinckx, Séverin 242-M, 93-N, 107-N
Amen, N. C. 219-T
Ames, Bernard M. 31-E, 128-E, 390-E, 527-E
Ames, B. F. 247-L

Amfiteatrova, T. A. . . . 423-Q, 795-Q
Ammann, Ernst 13-V
Ammareller, Sepp 217-F, 113-V
Amor, I. Asensio 299-M
Amrein, E. 351-S
Amstutz, E. 789-Q
Andant, A. 734-L
Anderko, Kurt 70-M
Anderson, C. A. 140-J
Anderson, Dewey 74-A, 219-A
Anderson, Eugene F.132-L, 871-L, 976-L
Anderson, G. C. 163-F
Anderson, Gene 817-L
Anderson, H. H. 419-R
Anderson, H. V. 765-Q
Anderson, James A. 277-D
Anderson, R. A. 441-Q
Anderson, R. G. 22-Q
Anderson, Sam 219-A, 257-A
Anderson, S. M. 294-L
Anderson, W. 211-T
Ando, Kohei 506-K
Andrade, E. N. Da C. . . . . 132-P, 125-Q, 455-Q, . 523-Q, 646-Q, 744-Q, 800-Q, 947-Q
Andrew, J. F. 231-S
Andrew, J. H. 12-Q
Andrew, K. F. 504-R
Andrews, F. A. 52-P
Andrews, John T., Jr. 99-E
Andrews, K. W. . . . 56-M, 178-N, 582-P
Andrews, P. W. S. 87-A
Andrews, Stephan 801-L
Andrievskii, A. I. 176-M
Andronikova, N. N. 259-R
Angier, Roswell P. 68-H
Angles, R. M. 58-L, 1-R
Angus, H. T. 455-E, 959-Q
Aniansson, Gunnar 360-M
Annaev, R. G. 258-P, 260-P
Annell, C. 510-S, 537-S
Ansel, G. 190-F
Ansell, E. W. 451-K
Anselmetti, Giancarlo 502-T
Anta, Maria do Carmo 168-N
Antes, Leland L. 87-P
Anthony, G. H. 111-D
Antinori, Erica 396-R
Apblett, W. R. 751-K
Apelt, Lucie 451-P
Appaly, Clemens 820-Q
Apperson, J. W. 49-T
Apold, Arne 767-K
Apps, R. L. 225-N
Arantes, Albert A. 155-J
Arbiter, Nathaniel 374-A, 108-B
Arblaster, H. E. 612-L, 305-R
Archard, J. F. 852-Q
Archibald, W. A. 280-D
Archinard, P. 450-R
Arend, A. G. 477-T
Arend, Heinrich 342-Q
Arentz, S. S. 347-A
Arenz, M. 179-F
Arkad'ev, V. K. 420-P
Arkhangel'skaia, Z. N. 249-G
Arkharov, V. I. . . 162-N, 567-Q, 360-R
Arlman, J. J. 376-M
Armatsev, D. A. 401-K
Armour, J. D. 128-J, 257-J
Armstrong, D. J. 542-Q
Armstrong, E. L. 346-R
Armstrong, L. D. 566-T, 569-T
Armstrong, T. N. 5-Q, 833-Q
Armstrong, W. M. 59-B
Arnitzen, C. E. 184-L
Arnold, S. M. 195-R
Arobone, A. 543-S
Aronin, Lewis R. 208-N
Arreghini, Enrico 523-S
Arthur, J. S. 402-P
Artman, Robert A. 475-Q, 476-Q
Ascherman, J. C. 768-Q
Aschoff, W. A. 73-C
Ascough, H. H. 77-F
Ashley, Samuel E. Q. 86-S
Askew, W. G. 139-D
Aspden, Harold . . . 93-P, 96-P, 356-P
Asprey, N. S. 527-P
Assibat, R. 737-L
Assmus, Fritz 84-P
Athanikar, S. G. 242-E
Atherton, J. W. 689-K
Atkinson, R. H. 442-Q
Atterton, D. V. 492-E
Attwell, J. F. 799-L
Aubertin, F. 1035-Q
Audubert, René 232-R, 260-R
Auerbach, Rudolf 28-R
Aul, W. R. 90-F
Auld, J. H. 183-M
Auler, E. P. 18-G, 100-G, 325-G
Aust, K. T. 471-M, 352-P
Austen, A. E. W. 626-Q
Austin, A. E. 275-M
Austin, C. R. 157-J, 223-J
Austin, D. T. 180-M
Austin, J. 526-E
Austin, J. B. 142-D, 354-D
Austin, William W., Jr. 77-D, 229-D, 73-E, 271-Q
Avakian, S. V. 231-K, 399-K, 469-K, 484-K
Averbach, B. L. . . . . 236-J, 77-M, . . 214-M, 183-N, 10-P, 316-Q, 985-Q
Aversten, I. 414-G

Avery, C. H. 330-F
Avery, Howard S. 251-Q, 289-Q, 1028-Q
Axelson, J. W. 15-B
Axon, H. J. 327-M
Ayres, Gilbert H. . . . 88-S, 188-S, 337-S
Aziz, P. M. 410-R
Azou, Pierre 261-R

B

Baab, K. A. 206-D
Babcock, R. S. . . . 34-G, 64-G, 132-G
Babington, W. 415-E
Babiskin, Julius 117-P
Bablik, H. 70-L, 237-L, 420-L, 760-L, 957-L
Bachelor, Robert W. 110-A
Back, A. E. 350-B
Backer, W. R. 334-G
Backstrom, M. L. 16-G
Backus, Thomas 90-G
Bacon, A. 468-L, 220-R
Bacon, Leslie R. 61-R
Badaeva, A. A. 249-G
Baeckstrom, S. 518-Q
Baenziger, Norman C. 64-M
Baer, W. H. 638-Q
Baes, L. 556-Q
Baffa, John J. 524-R
Bagley, K. Q. 330-M
Bagrov, N. N. 199-P
Bahke, E. 520-K, 270-T, 506-T
Bailey, A. R. 739-Q
Bailey, G. L. . 276-E, 50-R, 382-R, 99-V
Bailey, G. L. J. 544-K, 28-L
Bailey, G. R. 534-S
Bailey, J. C. . 48-K, 408-K, 770-K, 92-L
Bailey, R. W. . . . 187-Q, 363-Q, 425-Q
Bailey, T. W. 130-D
Bailitis, Eduard 578-P
Bain, J. 539-E
Baj, Mario 279-J
Baker, C. J. 255-P
Baker, Hayward R. 175-P
Baker, J. B. 2-B
Baker, J. F. 70-Q, 232-Q, 936-Q
Baker, J. J. 3-L, 889-L, 164-R
Baker, R. F. 436-Q
Baker, R. M. 101-D
Baker, W. A. 625-E
Balash, J. P. 15-R
Baldina, L. M. 206-N, 207-N
Baldridge, William M. 699-L
Balduzzi, P. 169-G
Baldwin, W. M., Jr. 614-Q, 224-R, 321-R, 542-R
Balezin, S. A. 474-R, 529-R
Balkovets, D. S. . 370-K, 471-K, 491-K
Ball, C. J. P. 38-V
Ball, F. A. 511-Q
Ball, H. W. 221-D
Ball, J. G. 122-K, 535-K
Ball, W. P. 269-P
Ballard, Lee 258-G
Ballard, W. E. . . . 85-L, 386-L, 603-L
Ballay, Marcel 101-Q, 945-Q
Ballet, Michel 73-Q
Ballhausen, Carl . . 5-H, 109-H, 517-Q
Ballinger, John C. 14-S
Ballou, J. K. 13-P, 140-P
Balluffi, R. W. . . . 59-N, 89-P, 538-P
Bampfylde, J. W. 733-Q
Ban, T. E. 104-B, 370-B
Banerjee, N. G. 166-A
Banerjee, S. K. 273-B
Banerjee, T. 166-A, 334-A
Bangert, Lothar 349-Q
Banks, H. R. 282-B
Banks, W. 279-D
Banner, R. G. 88-B
Banning, Lloyd H. 65-B
Baptista, A. 311-P
Baranov, S. M. 259-M
Baranova, N. A. 165-P
Barber, C. R. 193-T
Barber, R. 22-S
Barbero, M. 396-D, 113-E
Barbezat, S. 80-R
Barbian, H. A. 474-L, 463-R
Barbour, F. C. 305-D
Bardeen, J. 229-N, 262-N
Bardenheuer, P. 454-P
Bardet, G. 377-S
Bardgett, W. E. 147-Q
Bardin, I. P. 234-A
Bardin, P. C. 246-L, 251-L, 259-L, 260-L, 619-L
Bardolle, Jean 214-N, 527-R
Barefoot, R. R. 269-S
Barker, R. S. 640-Q
Barkow, A. G. 301-K
Barnard, K. N. 197-R, 213-R
Barnes, H. C. 209-D
Barnes, John R. 152-D, 192-D
Barnes, R. S. 30-N, 228-N
Barnett, C. S. 321-N
Barnett, R. S. 413-R
Barnett, S. J. . . . 503-P, 519-P, 562-P
Baron, J. 240-G, 256-T
Baron, L. I. 194-B, 208-T
Barr, W. 114-F, 54-T
Barraud, Jean 404-M
Barrett, C. S. . . . 312-M, 11-N, 182-N
Barrett, Louis 526-K
Barrett, R. M. 314-T
Barringer, Edwin C. 67-A

Barrling, Lars 406-E, 74-S
Barros, Carlos de Revoredo 117-H, 83-Q
Barrows, W. A. 978-L
Barry, Frederick M. 67-C
Barsch, G. 389-P
Barteld, Klaus 248-S
Bartels, K. D. 114-D
Bartenev, G. M. 395-P, 396-P
Barth, Walter 290-D
Bartholomew, F. J. 137-A
Bartocci, A. 59-Q, 143-T
Barton, H. K. . . . . 34-E, 141-E, 188-E, 189-E, 281-E, 360-E, . .419-E, 442-E, 132-F, 300-G, 435-L
Bartski, W. A. 252-L
Baruch, Pierre 131-M
Barwell, F. T. . . 292-Q, 582-Q, 1002-Q
Barun, V. A. 308-S
Bary, J. 546-L
Barzin, H. 363-B
Basel, G. von 796-Q
Bashforth, G. Reginald 89-D, 171-D, 245-D
Basinske, Z. S. 240-M, 270-N
Bassett, H. Y. 186-F
Bassi, Guido 143-N, 211-N
Bastien, Paul . . . . . 252-M, 378-M, 63-N, 89-N, . .509-Q, 543-Q, 661-Q, 215-R, 261-R
Batchelder, F. W. von 85-M
Batcheller, H. G. 380-D
Batdorf, S. B. 121-Q, 122-Q
Bate, J. A. 138-P
Bateman, Alan M. 34-B
Bateman, Catherine M. 736-Q
Bateman, J. B. 111-P
Bates, Henry 878-L
Bates, L. F. 128-P, 129-P, 299-P, 363-P, 482-P
Bathe, C. E. 58-T
Batisse, M. 110-N, 303-N
Batovrin, A. A. 475-K
Batty, J. V. 95-B
Batz, W. 294-N
Baudart, G. A. 289-B
Bauer, E. 99-M, 152-M
Bauer, Wolf G. 103-C
Baugh, C. E. 284-R, 309-R
Bauhan, E. C. 179-P
Baukloh, W. 587-P
Baumann, F. 742-L
Baumann, Henry N., Jr. 118-N
Baumgardt, Wilhelm 26-D
Baumgartner, W. 30-T, 36-T
Baxter, J. P. 305-A, 66-C
Bayer, Lisel 18-C
Baylis, John R. 153-R
Beach, William I. 39-T
Beall, F. W. 124-K
Beamish, F. E. . . . 269-S, 513-S, 514-S
Beams, J. W. 845-Q
Bean, James J. 173-B
Beard, D. S. 400-M
Beasley, John K. 215-P
Beatson, E. V. . . . 3-K, 145-K, 206-K, . . 243-K, 424-K, 613-K, 740-K, 774-K
Beattie, C. W. 141-N
Beattie, H. J., Jr. 382-M
Beatty, S. 397-M
Beaubien, P. E. 321-M
Beaujard, Louis 121-M, 413-M
Beaver, H. O. 9-F, 12-F
Becher, C. 389-G
Bechtel, H. 168-S
Bechtel, L. D. 354-B
Bechtold, James H. . . 6-Q, 53-Q, 394-Q
Beck, A. J. W. 762-L
Beck, D. A. 463-T
Beck, F. H. . . . . 13-R, ... 43-R, 51-R, 52-R
Beck, F. J. 51-P
Beck, Lilian Heikkinen 431-M
Beck, Paul A. . . . . 128-M, ...193-M, 241-M, 430-M, 41-N, . . 193-N, 273-N, 317-N, 238-P, 163-Q
Beck, Roy D. 37-L, 889-L
Beckmann, M. E. 153-L, 530-L
Beckel, J. L. 226-Q
Becker, K. 635-K
Beckerley, J. G. 63-A
Bedford, Gordon T. 159-J
Bedos, R. 298-P
Beech, A. S. 177-E, 194-E, 239-E, 259-E
Beecher, William 139-E
Beedle, Lynn S. 420-Q
Beeghly, H. F. . . . 89-S, 140-S, 383-S
Beevers, C. A. . .305-M, 437-M, 438-M
Begeman, M. L. . . . 369-E, 44-K, 780-K
Begun, S. V. 66-G, 170-G
Behr, Fred 205-S
Behrens, F. S. 145-A
Béja, Mauricio 47-V
Beildeck, Byron M. 163-R
Beilhack, M. 595-E
Bekebrede, W. R. . . . 543-T, 190-V
Belcher, K. H. 587-L
Belcher, Ralph 284-S
Belderbox, C. F. 308-G
Belekar, G. K. 121-A
Beletskii, M. S. 175-M
Beliaev, A. I. 122-V
Bell, C. C. 224-B
Bell, D. I. 256-D
Bell, H. B. 262-B

Bell, James E. 95-A
Bell, R. C. 755-Q
Bell, Rosemond K. 15-S
Bell, Vance 88-T
Bello, Francis 429-E
Belon, P. 137-C
Belov, K. P. 159-P
Belov, L. N. 311-K, 470-K
Belser, Richard B. 764-L
Belvin, Charles H. 405-L, 450-L
Benard, Jacques 527-R
Benbow, W. E. 35-V
Benda, Antonin 28-D
Bender, Bob G. 29-K
Bender, R. S. 402-P
Bendigo, Bruce B. 15-S
Benedicks, C. 73-P, 558-P
Benedict, C. Harry 270-A
Benesovsky, Friedrich 458-M, 30-P, 118-V, 134-V
Benner, Stanley G. 501-L, 534-L, 554-L, 558-L, 638-L
Bennet, A. G. 866-L
Bennett, Alva H. 27-M
Bennett, John A. 766-Q
Bennett, K. W. 538-E, 713-L
Bennett, Norman 640-E
Bennett, P. S. 718-L, 719-L
Bennett, W. D. 128-N, 171-N, 271-N, 292-N
Bennett, William E. 206-L
Bennister, H. L. 478-R
Benson, N. D. 10-Q, 484-Q, 897-Q
Bentele, M. 246-Q
Bentley, R. B. 6-M
Benton, C. C. 112-D, 259-D
Bentzel, R. J. 101-T
Benussi, Lino 526-S
Beonem, Frank L. 233-L
Berak, Josef 291-M
Berberina, E. 14-L
Berezina, S. I. 396-L
Berg, C. 430-T
Berg, Eugene W. 188-S
Berg, J. E. 348-A
Berg, J. ter 459-K
Berg, Morris 885-L
Bergan, M. D. 585-K
Bergen, James T. 762-Q
Bergen, J. A. van 340-K
Bergen, Van 124-E
Bergh, W. J. van den 115-J
Berghezan, A. 109-N
Bergier, J. 184-P
Berglund, Stig 286-N
Bergman, Gunnar 301-M
Bergmann, E. 262-K
Bergmann, W. W. 98-D
Bergqvist, B. 358-Q
Bergsman, E. Borje 414-R, 479-R
Berkeley, John 16-K
Berlien, Paul B. 169-Q
Berliner, R. C. 402-G
Berlinghof, Henry Jr. 423-T
Berman, R. 28-P, 131-P
Bermane, D. 317-P, 137-R
Berna, Tell 380-A
Bernard, G. G. 498-R
Bernard, Rene 520-L, 262-S
Bernavskii, V. V. 207-S
Bernhard, E. E. N. 345-K
Bernhard, Jakob 351-L
Bernhardt, L. 485-G
Bernstein, Harold 571-E, 73-F
Bernstein, J. 491-E, 535-E
Berntson, Charles M. 765-L
Berrick, N. D. 838-Q
Berriman, R. W. 119-V
Berry, B. E. 1-H, 18-H
Berry, C. D. 98-E
Berry, Chester R. 472-M
Berryman, Lloyd G. 2-E
Berta, R. 525-S
Berthold, Rudolf 29-S, 109-S, 213-S, 282-S, 442-S
Bertossa, R. C. 777-K
Bertram, Walter 188-D
Berwick, I. D. G. 534-R, 541-R
Besselievre, Edmund B. 363-A
Besson, Jean 24-R, 449-R
Betcherman, I. I. 7-C
Bettembourg, M. 343-D
Bettembourg, P. 320-D
Betteridge, W. 11-Q
Betterton, J. O. 191-M, 329-M
Bettridge, W. 522-Q
Betz, C. R. 295-S
Beuse, Hans 538-S
Bever, M. B. 76-M, 235-M, 293-N, 500-P
Beyer, Gerhard H. 89-B
Bezuglyi 244-P
Bhat, U. V. 308-N
Bhatia, A. B. 223-P
Bhattacharya, S. 1052-Q
Bianchi, G. 283-P, 145-R
Bibber, L. C. 649-Q
Bickel, E. 63-J, 791-Q
Bickerdike, R. L. . . . 48-H, 357-Q, 55-T
Bidder, E. R. 676-K
Biegler, Hans 862-Q, 431-R
Bienfait, H. 340-K
Bier, C. J. 83-H
Bierbrauer, Ernst 205-B
Biermasz, A. L. 957-Q
Biers, H. 133-D, 122-G

Bigelow, C. G. 164-B
Biggart, W. Gibson 299-K, 423-K
Bighi, C. 546-R
Bihet, O. L. . . . 334-Q, 817-Q, 523-R
Bijvoet, J. M. 446-M
Bilardin, Guy 340-P
Bilhartz, H. L. 198-R, 209-R, 458-R, 476-R
Bilharz, O. W. 345-A
Billig, E. 225-P, 547-P
Billigmann, Joseph . 236-F, 322-F, 175-J
Billingham, W. H. 346-L
Billington, D. S. 108-Q
Billy, M. 279-S
Binai, Walter R. 29-L, 924-L
Bindeman, H. L. 92-K
Binder, Ira 396-M
Binder, R. W. 693-K
Bingel, Jakob 45-N
Binger, W. W. 42-R, 362-R
Binnie, D. 254-D
Birch, David 352-G
Birch, I. J. 41-E
Birchenall, C. E. 55-N, 263-N, 294-N, 316-N, 229-R, 230-R
Bircumshaw, L. L. 1-P, 311-R
Birdsall, G. W. . . 44-F, 339-K, 139-T
Birkholz, R. J. 252-R
Birks, L. S. 403-M, 105-S
Bisacre, G. H. 128-G
Bish, R. E. 63-M
Bishop, H. F. . . . 68-E, 86-E, 310-E, 522-E, 576-E, 40-N, 51-N, 427-Q
Bishop, J. F. W. 65-Q
Bishop, S. M. 881-Q
Bishop, Tom 197-D, 112-J
Biskeborn, H. W. 251-T
Bisson, Edmond E. 142-P, 396-Q, 843-Q
Bittner, H. 98-M, 152-M, 228-M
Bjorling, G. 257-B
Black, J. E. 359-Q
Black, W. A. 370-S
Black, William 344-A
Blackband, W. T. 23-P
Blackburn, Paul E. 209-P
Blackman, Bernard . . . 153-A, 197-G
Blackman, M. 46-P
Blagodatskii, L. I. 521-L
Blaha, F. 193-P
Blair, Carvel Hall 133-R
Blair, R. H. 248-K
Blair, T. A. 257-Q
Blake, E. A. 70-E
Blake, K. R. 454-G
Blake, L. S. 781-L
Blakiston, J. 276-E
Blan, H. A. 387-R
Blanc, Georges 645-E
Blanchard, M. K. 131-L
Blanchard, P. 502-E
Blanchetais, Charlotte Henry la. 297-P
Blanchot, Jean 35-T, 331-T
Blanc-Lapierre, Andre 278-P
Bland, D. R. 241-F, 295-F
Bland, J. 494-S
. . . . . .743-K, 494-S
Blanderer, Josef. 445-S
Blanderer, Joseph. 76-C
Blane, James 19-G, 237-G, 255-T, 255-T
Blank, A. I. 612-Q
Blanot, J. 215-R
Blaser, R. U. 332-Q, 776-Q
Blashke, T. O. 436-T
Blatz, Hanson 332-A
Blaurock, E. E. 142-K
Blazey, Clement 84-V
Bleakley, W. Y. 96-R
Bleich, Friedrich 401-Q
Bleicher, W. 101-V
Blesch, Louis C. 221-E
Bleton, J. 215-R
Blewitt, T. H. 84-N, 313-Q
Blin, Jean 93-M, 412-M, 120-N
Blink, W. P. van den 340-K
Bloch, Peter K. 174-S
Blocher, John M. 156-C, 166-V
Block, E. H., Jr. 780-K
Blocker, H. G. 77-H, 128-H
Blodgett, Omer 794-K
Blohn, H. C. von 105-F
Blok, H. 524-Q
Blok Van Laer, K. J. 286-Q
Blomquist, R. F. 545-K
Blondel, Albert 332-S, 461-S
Bloom, David S. 194-M, 331-P
Bloom, F. K. 571-P, 161-V
Bloomberg, Ray 96-K, 64-T
Bloor, W. A. 339-E
Blount, Ezra A. 139-L, 342-L, 641-L, 686-L
Blum, George W. 138-A
Blum, William 49-L, 556-L
Blumberg, H. S. 350-M
Boam, Willard M. 593-K, 662-K
Boarts, Lyle R. 338-G
Bock, W. K. 90-E, 489-E
Bockris, J. O'M. 119-P, 236-P, 304-P, 383-P, 465-P, 554-P
Bockstruck, Herman N. 559-K
Bodmer, A. E. R. 351-S
Boeckers, Erich 58-D
Boegehold, A. L. . 237-J, 826-Q, 469-T
Boehm, Fritz 235-F
Boeke, C. L. 218-B

Boertzel, H. J. 83-V
Boesche, H. 415-T
Bogacheva, G. N. 191-N, 204-N
Bogardus, K. O. 668-Q
Böhler, H. B. 460-Q
Bohnstedt, Ulrich 449-R
Boice, E. G. 539-T
Boice, W. K. 85-K
Boiten, R. G. 957-Q
Bojarski, Z. 25-M
Boljahn, Heinrich 974-L
Bolkcom, W. T. 190-B
Bolkhovskoi, G. A. 272-G
Boll, H. J. 308-K
Bollenrath, Franz . 104-Q, 718-Q, 820-Q
Bollinger, L. E. 53-S
Bolognesi, Giampaolo 395-L, 997-L, 289-P
Bol'shova, K. M. 419-P
Bolton, J. W. 1009-Q
Boltz, D. F. 87-S, 189-S, 336-S
Bolz, L. H. 917-L
Bolz, Roger W. 592-E, 274-G
Bonanno, Joseph L. 65-H
Bond, D. C. 498-R
Bond, Fred C. 217-B, 353-B
Bond, J. A. 202-D
Bondy, O. 695-K
Boneisch, Edith 19-H
Bonem, Frank L. 642-L, 784-L
Bonfiglioli, G. 406-P
Bonsack, Walter 94-V
Bonzel, M. 215-F
Bookley, J. B. . . 498-P, 541-P, 542-P
Boom, E. A. 408-M
Boore, J. Perc 27-F
Boorse, H. A. 272-P, 552-P
Booser, E. R. 497-T
Booss, Hans-Jurgen 175-R
Booth, R. B. 178-B
Booth, Sherman F. 508-S
Bor, J. 564-P
Borchart, K. 152-J
Borchers, Heinz 300-A
Bordes, A. 448-E
Borel, J. P. 37-P
Borelius, G. 286-N
Boreskov, G. K. 580-P
Born, Kurt 1040-Q
Borsoff, V. N. 1021-Q
Borzdyka, A. M. 376-Q
Borysowski, Z. 386-Q
Boston, O. W. 471-G
Boswell, F. W. C. 282-M
Bott, H. B. 93-K
Bouchet, Pierre-Jean 263-S
Boudart, M. 427-P
Boulger, Francis W. 185-A, 136-G, 510-G
Boulanger, Christian . . . 71-Q, 72-Q
Boullon, F. 47-L
Bouman, J. . . . . 369-M, . 372-M, 374-M, 375-M, 376-M, 418-M
Bounds, A. M. 560-T
Bourassa, Harold 186-E, 330-E
Bourke, W. T. 389-Q
Boussard, Francois 471-E
Bouton, M. 601-Q
Bouvier, Henry de 1085-Q
Boveri, Brown 166-J
Bowden, F. P. 27-P, 95-Q, 559-Q, 578-Q, 1024-Q
Bowden, J. S. 193-A, 262-A, 357-A, 378-A
Bowen, Dwain 197-J
Bowen, F. J. 107-S
Bowen, I. G. 283-R
Bowen, K. W. J. 253-N
Bowers, C. N. 494-R
Bowers, W. F. 99-D
Bowker, Albert H. 423-S
Bowles, J. S. 321-N
Bowles, Oliver 352-B
Bowman, Donald C. . 52-L, 124-L, 889-L
Boyd, John R. 268-S
Boyer, Howard E. 61-J, 115-J, 587-Q, 648-Q
Boyle, E. D. 302-E
Boyle, J. L. 244-D
Bozsin, Michael . . . 121-L, 148-S, 288-S
Brace, A. W. 459-E, 276-L
Brace, P. H. 328-E, 234-K
Brachmann, Wilhelm 745-L
Bradbury, E. J. 80-J, 136-J
Bradley, A. J. 18-M, 177-N
Bradley, H. 602-K, 670-K
Bradley, James P. 105-A, 368-B
Bradley, J. H. 104-J
Bradley, P. R., Jr. 368-B
Bradley, R. S. 43-N
Bradley, W. W. 393-L
Bradshaw, F. J. 355-M
Bradshaw, G. 221-S
Brady, Bryce 58-T
Brady, George S. 16-V
Braeuninger, K. F. 103-F
Bragdon, Charles R. 245-L
Bragg, W. L. 336-M
Braidwood, W. W. 87-V
Brailsford, F. 33-P
Brailsford, George 8-J, 9-J, 31-J, 169-J
Brain, R. C. 6-G
Braithwaite, C. 221-R
Brancker, A. V. 5-D
Brand, B. G. 551-L
Brandauer, Gundolf 406-M

Brandenberger, E. 462-S
Branders, H. 12-K
Brandes, E. A. 207-F
Brandt, D. J. O. 206-B, 204-D
Brandt, F. A. . . . 86-E, 576-E, 40-N
Brandt, F. L. 61-K
Brandt, Werner 58-P
Brandt, William E. 137-L
Brandwood, J. K. 190-D
Brantley, L. Reed 442-L, 912-L
Brashear, J. M. 107-D, 131-D
Brasher, D. M. 20-R, 149-R
Brasunas, Anton deS. 280-R
Bratten, F. W. 473-Q
Braumann, Franz 234-N
Braun, F. C. 160-R
Braun, Hermann 271-T
Braun, K. C. 384-S
Brauns, Erwin 970-L
Bray, J. L. 177-A, 14-D
Bray, K. F. 59-F
Brayshaw, E. E. . . . 1-F, 54-F, 327-F
Breckenridge, R. G. . . . 462-T, 515-T
Breckpot, R. 383-D
Brefort, J. 279-S
Bregman, Adolph 35-F
Breil, Gunther 37-C
Breitenstein, John S. 19-B
Breitfeld, Helmut 355-S
Breitmayer, Theodore 338-B
Bremer, Edwin 197-E
Breneman, James D. 890-L
Breneman, John W. 1006-Q
Brennan, J. H. 77-V
Brennan, W. E., II 73-C
Brenner, Abner 592-L, 646-L, 679-L, 758-L, 780-L
Brenner, P. 819-Q
Breston, J. N. 404-R
Breton, H. K. 111-F
Breymeier, R. T. 446-K
Brichta, J. C., Jr. 808-L
Brick, R. M. . . . 193-Q, 194-Q, 909-Q
Bridgewood, V. H. 328-D
Bridgman, P. W. 276-P, 304-Q
Briggs, H. B. 544-P
Bright, Harry A. 15-S, 61-S
Brill, R. 34-M
Brinberg, I. L. 119-K
Brinck, Aren 266-T
Brindley, G. W. 143-M
Brinson, G. 160-N
Brisack, A. G. 330-F
Brisbin, P. H. 124-H
Brisby, M. D. J. 266-A
Brislee, F. J. 478-T
Brissey, Ruben M. 338-S
Bristow, C. A. 77-A
Bristow, J. R. 175-Q, 387-Q
Britton, S. C. 58-L, 601-L, 1-R, 111-R, 426-R
Britton, W. C. 444-R
Brizard, André 415-G
Broadbank, R. W. C. 363-S
Broadfield, K. H. 514-L
Broadston, James A. 437-S
Broadwin, S. 463-E
Brockhaus, Siegfried 334-R
Brodskii, A. Ia. . . 274-K, 400-K, 556-K
Broeze, J. J. 325-R, 49-S
Broida, Victor 82-P
Bromage, K. 282-E, 479-E
Bromley, D. 213-S
Bromley, LeRoy A. 74-P
Bronson, E. L. 3-P
Brook, W. H. 191-D
Brooke, Maxey 485-R
Brooker, H. R. . . . . 145-K, 206-K, . . 243-K, 424-K, 613-K, 740-K, 774-K
Brooks, F. C. 548-P
Brooks, Harvey 349-P
Brooks, L. S. 66-P
Brooks, Roger 514-G
Broom, T. 366-P, 367-P, 597-P
Brophy, J. E. 34-P
Broschke, H. 544-Q
Brosky, Stanley A. 36-S, 50-S
Brotherton, W. P. 410-G, 441-G, 362-K, 392-K
Broun, M. Ia. 373-K
Brouwer, A. A. 834-L
Brower, T. E. 17-D
Brown, A. F. 9-Q, 1007-Q
Brown, Alan W. 434-L
Brown, A. R. G. 153-Q
Brown, B. F. 26-N
Brown, B. R. 394-M
Brown, C. C. 115-D
Brown, Charles Owen 444-K
Brown, David P. 742-K
Brown, D. C. 373-S
Brown, D. E. 166-N
Brown, D. I. . . . . 29-A, 138-D, ... 272-D, 14-E, 56-V, 192-V
Brown, D. R. 224-D
Brown, E. J. 624-Q
Brown, Eric D. 61-S
Brown, G. L. 540-Q
Brown, Herbert F. 681-Q
Brown, Hiram 479-Q
Brown, J. F. 433-M
Brown, K. A. 272-P
Brown, K. B. 53-B
Brown, M. H. 362-R, 161-V
Brown, R. H. 362-R
Brown, Sheldon 503-P

Brown, W. F., Jr. . 305-Q, 671-Q, 673-Q
Brownell, Gordon L. 370-P
Brownell, Lloyd E. 152-A
Browning, James A. 779-K
Brubacker, G. B. 579-K
Bruckart, K. B. 383-L, 180-N
Bruckart, W. L. 166-L, 883-Q
Bruckner, W. H. 421-Q
Bruehl, Rudolf 845-L
Brüggeman, T. 112-F
Brugman, F. W. 196-N
Bruijn, W. de 569-L
Brumbach, G. E. 265-Q
Brun, J. 171-R
Brunberg, Paul E. 146-G
Bruni, Giordano 24-M
Brunner, Elizabeth 87-A
Brunst, Walter 809-K
Brush, John E. 118-A
Brutcher, Henry 158-G, 22-T
Bruxelles, G. N. 404-L
Bryan, Ford R. 118-S
Bryan, J. M. 723-L, 457-R
Bryan, R. G. 338-D
Bryan, R. R. 196-B
Bryant, F. 448-R
Bryant, J. W. 323-E
Bryant, L. R. 355-R
Buchanan, L. B. 187-M
Buchanan, R. A. 297-D, 364-S
Buchanan, W. Y. 237-E
Buchen, W. 637-E
Buck, Thomas M., Jr. 65-P
Buckel, W. 287-P
Buckeley, August 354-E
Buckeley-Liesegang, Marie . . 354-E
Bücken, Curt 183-T
Bucken, Helmut 350-D, 391-D
Bückle, Charlotte 21-M
Buckle, E. R. 914-L
Bückle, H. . 120-N, 136-Q, 295-Q, 561-Q
Buckle, K. L. 361-T
Buckley, L. 142-E
Buckley, W. H. 22-Q
Bucklin, Albert G. 866-Q
Buckman, W. B. 172-S
Bucknall, E. H. 511-Q
Bucknell, G. L. 645-L
Buczynski, J. J. 268-Q
Buehl, R. C. . . . 185-A, 107-B, 280-B
Buehler, E. 462-P
Buerger, M. J. 55-M, 10-N
Buffam, B. S. W. 23-B
Buffington, F. S. 314-N
Buffman, Donald C. . . . 876-Q, 877-Q
Bugakov, V. A. 195-N
Buhler, Hans 447-E, 280-J, 466-Q, 857-Q, 860-Q
Buhler, John 272-M
Buinov, N. N. 48-M, 135-M
Buehler, E. 58-N
Bukin, F. I. 243-T
Bukowiecki, A. 417-R
Bulle, Georg 78-A
Bumbaugh, Robert J. 34-R
Bumps, E. S. . . . 236-M, 384-M, 996-Q
Bunch, Thornton C. 307-E
Bungardt, Karl 189-D, 301-R
Bungeroth, Adolf 325-D
Bunin, K. P. . . . 110-E, 135-N, 222-N
Bunji, Bela 267-B
Burbank, Robinson D. 247-M
Burch, Gene 71-G
Burdese, Aurelio . 397-D, 398-D, 134-M
Burgan, B. R. 214-P
Burger, R. J. 94-R
Burgers, W. G. 341-M, 377-M, 219-N, 251-N
Burgess, C. O. 50-E, 106-E, 235-E, 720-K
Burghardt, Alden M. 82-H
Burghoff, H. L. 612-Q
Burgoon, Bennett, Jr. 109-T
Burk, F. C. 810-Q
Burkart, W. 357-L
Burke, E. C. 266-Q
Burke, F. E. 322-N
Burke, J. E. 75-N, 267-N, 537-Q
Burke, Theodore H. 435-E
Burket, R. E. 278-M
Burmester, H. J. 191-G
Burnett, Graydon E. 943-L
Burnett, H. C. 452-M
Burnheim, Hermann 818-Q
Burnley, G. F. 451-G
Burns, B. D. 46-H
Burns, Milton P. 129-D
Burns, R. S. 142-G
Burr, A. C. 18-P
Burrell, G. A. 191-F
Burroughs, L. R. 8-T
Burrow, W. R. 364-B
Burshtein, R. Kh. . . . 201-P, 303-R
Burston, R. M. 209-V
Burt, Fred M. 28-G, 330-G, 38-K, 517-K, 390-K, 566-K, 647-K, 34-L, 317-L, 678-L, 774-L
Burton, E. J. 49-S
Burton, G. K. 138-J
Burton, J. A. 58-N
Burwell, J. T. 96-Q, 281-Q, 577-Q
Busch, G. 70-P
Buschmann, S. 257-T
Buschow, A. G. 339-L
Buser, P. 159-C
Busey, R. H. 397-P

Bush, N. L. 599-E
Bush, S. H. 5-J
Bushell, L. A. 38-R
Bushell, R. 13-K
Bushell, T. W. 402-E, 543-E
Bushnell, T. W. 402-E, 543-E
Busk, R. S. 87-M
Buske, Alfred 218-Q
Busker, David 783-L
Buskett, Evans W. 82-C
Buswell, R. W. A. 72-H
Butler, G. 174-E
Butler, J. A. V. . . 382-P, 384-P, 385-P
Butler, J. C. 28-N
Butler, J. E. 196-F
Butler, J. M. 21-H
Butler, Kenneth 879-L
Butler, P. 87-T
Butler, R. 439-R
Buttler, M. W. 150-Q
Buttner, F. H. . . . 12-P, 308-P, 393-Q
Button, J. C. E. 50-Q
Buzzard, R. W. 447-Q
Byler, Raymond E. 91-B
Byorum, R. A. 161-V
Byrns, A. C. 39-B
Byron, E. S. 436-Q
Bystram, M. C. T. 161-V

C

Cabarat, R. 209-N, 226-N
Cable, H. E. 541-K
Cable, J. Wesley 67-E
Caccavo, Licio 739-L
Cadwell, Donald E. 122-B
Cahn, R. W. 147-M
Cahoon, Harold P. 532-L
Caine, J. B. 275-E, 525-E
Calder, A. W., Jr. 13-E
Caldwell, David O. 553-P
Caldwell, J. A. 422-R
Caldwell, M. R. 100-R
Caley, Earle R. 235-S
Calhoun, W. A. 20-B, 94-B
Calker, Jan Van 443-S
Calkins, V. P. 399-T
Callen, E. 520-P
Callen, Herbert B. 114-P
Callenfels, G. W. Stein 49-S
Calnan, E. A. 432-M, 190-Q, 326-Q, 703-Q
Calvo, Felipe A. 349-M, 686-K
Cam, D. 930-L
Cameron, A. 1002-Q
Cameron, D. I. 123-N
Cameron, J. A. 146-J
Cameron, W. G. 184-D
Camerson, Francis 353-A
Cametti, B. 773-Q
Caminada, A. A. 383-G
Campbell, A. N. 187-M
Campbell, Byron F. 658-L
Campbell, Charles H. 125-S
Campbell, Frances M. 30-G
Campbell, Hallock C. 1079-Q
Campbell, H. D. 552-K
Campbell, I. E. 50-A, 432-L, 433-L, 438-L, 203-V
Campbell, J. E. 113-M
Campbell, Mary E. 339-S
Campbell, Murray 21-A
Campbell, R. W. 306-D
Campbell, W. J. 367-D, 271-L
Campbell, W. P. 398-M
Campbell, W. R. 252-Q
Campbell, W. W. 477-S
Canevari, Niccolo Rossi 164-S
Cann, H. 291-L, 428-L
Cannaday, R. L. 52-Q
Cantwell, J. B. 604-E
Canzler, Heinrich 840-L
Cape, Gordon 800-K
Caplan, D. 321-M, 489-R
Capozzoli, L. J. 30-Q
Cappon, A. 193-E
Card, Harold S. 512-K
Cardwell, P. H. 108-L
Carey, J. D. 343-T
Carlisle, S. S. 286-A, 45-S
Carlson, Allan 184-N
Carlson, E. C. 379-R
Carlson, Ronald 360-Q
Carlsson, C. Georg 187-S
Carmichael, E. P. 71-K
Carne, I. H. 53-H
Caroli, Alessandro 526-S
Caron, Michel 31-S
Carpenter, Gordon . . . 422-L, 912-L
Carpenter, J. E. 23-Q
Carpenter, Jean Richards . . . 47-A
Carpenter, R. P. 259-D
Carr, Charles C. 20-A, 167-A
Carr, David P. 421-T
Carr, D. S. 56-L
Carr, Frank L. 876-Q, 877-Q
Carr, George W. 980-L
Carr, H. 467-S
Carr, L. H. 410-E
Carr, W. J., Jr. 219-P
Carr-Harris, G. G. M. . 655-E, 656-E, 657-E, 796-K, 797-K, 798-K, 545-S
Carriere, J. E. 257-R
Carrington, R. A. G. 324-S
Carro-Cao, Guiseppe 1089-Q
Carroll, K. G. 86-M

Carroll, Walter 72-V, 73-V
Carruthers, M. E. 161-V
Carson, O. A. 180-M
Carson, Robert W. 246-T
Carta, Mario 201-B
Carter, J. J. 741-Q
Carter, L. L. 380-T
Carter, P. T. 262-B
Carter, R. 65-C
Carter, S. F. 218-D, 320-E
Carwile, Nesbit L. 538-Q, 657-Q, 758-Q, 905-Q, 997-Q
Cary, Howard 77-K
Casajus, Salvador Ma. Checa . 685-K
Case, S. L. 357-B, 1049-Q
Casey, Robert S. 19-A, 543-T
Cassels, J. M. 273-P
Castaing, R. 258-S
Castelliz, L. 104-P
Castello, Carlo 1091-Q
Castro, René 30-S, 333-S
Caswell, John A. 24-J
Cates, Louis S. 187-A
Catterall, J. A. 129-M
Cattin, G. 49-G
Cauchois, Y. 218-P
Cauger, Edward H. 326-D
Caugherty, B. 278-M, 255-S
Caughey, R. H. 86-Q
Caule, E. J. 301-S
Cavallaro, L. 998-L, 172-R, 275-R, 546-R
Cavanagh, P. E. 72-D, 83-D, 87-D, 135-D, 211-D, 341-D, 280-L
Cave, G. C. B. 486-S
Cave, R. 377-S
Cecchi, D. 226-K
Cecil, Paul S. 81-L
Celler, Emanuel 219-A
Century, B. A. 229-Q, 415-Q
Cerkesov, Ivan 347-T
Cerne, P. S. 418-G
Cerwenka. Ernst 254-M
Chadwick, R. 37-Q
Chalmers, Bruce 217-M, 315-M, 449-M, 474-M, 213-N, 293-N, 299-N, 352-P, 354-P, 604-P, 322-Q, 761-Q
Chalmers, Robert A. 99-S
Chamberlain, Paul G. 574-L
Chamberland, H. J. 126-G, 143-G, 345-G, 449-G, 68-K
Chamberlin, Roy 129-E
Chambers, R. G. 182-P
Champion, F. A. . . 336-L, 482-R, 490-R
Champion, Harold 41-V
Chang, C. S. 92-B
Chang, H. C. 534-Q
Chang, Lo-Ching 239-N
Chang, P. L. 128-N, 171-N, 292-N
Channon, S. L. 254-N
Chanson, Paul 67-M
Chao, B. T. 128-G, 404-G, 406-G, 487-G
Chao, Chu Yung 24-R
Chapin, Henry J. 1028-Q
Chaplygina, E. M. 181-B
Chapman, E. E. 138-S
Chapman, F. 64-K
Chapman, R. D. 874-Q
Chappie, Hubert . . 101-G, 102-G, 294-G
Chappuis, Andre 177-T
Charity, Frank 119-C, 498-E, 143-F, 164-G, 265-G, 443-G, 1-K, 41-K, 726-K, 241-Q, 202-T
Charles, R. J. T. 20-S
Charlesworth, P. A. 715-L
Charlton, N. 40-E, 335-E
Charmandarian, M. O. 259-R
Charvat, V. K. 208-L
Chase, Herbert . 149-E, 155-E, 244-E, 32-G, 69-G, 103-G, 111-G, 218-G, 511-G, 187-J, 732-K, 48-L, 687-L
Chatelain, J. B. 121-B
Chatterjea, A. B. . 107-Q, 539-Q, 1056-Q
Chatterjee, G. P. . . . 307-N, 587-P
Chaudron, Georges 454-M, 477-M, 106-N, 138-R, 253-R, 31-S
Chaussin, C. 177-S
Chaussain, Marcel . . . 238-S, 410-S
Chavy, Raymond 101-Q
Chawner, P. M. H. 198-J
Chebiniak, Paul 270-S
Chebotarev, I. A. 162-P
Chegwidden, J. R. 28-F
Chegwidden, R. A. 230-P
Cheleshchev, E. V. 161-N
Chelminski, Roman 171-B
Chen, N. K. 140-N, 322-N, 440-Q, 990-Q, 1013-Q
Cheney, D. R. 49-K
Cheney, Richard 301-B, 332-F, 29-G, 194-J
Cheng, C. M. 57-Q
Cherkashin, E. E. 178-M
Chernashkin, V. G. 481-K
Chernock, Warren P. 167-M
Chesters, J. H. 18-D, 44-D, 128-D, 144-D, 286-D
Chesalova, V. S. 580-P
Chesterfield, A. 928-L
Chestnov, A. L. 180-Q
Chevenard, P. 253-M
Chevrier, André . 155-T, 203-T, 413-T
Chiaverini, Vicente . . . 155-J, 83-Q
Chikazumi, Soshin 240-P
Childs, H. C. 216-T
Chindgren, C. J. 350-B

Chinnappa, K. V. 785-Q, 1058-Q
Chion, René 291-E
Chiotti, P. 195-B
Chipman, John . . . 91-P, 329-P, 332-P
Chmielewski, Stephan 721-K
Chow, Joe Gin-Young 1050-Q
Chrétien, André 128-C
Chrétien-Horand, W. 44-E
Christensen, Carl J. 184-N
Christenson, A. L. 873-Q
Christian, Darleane 405-P
Christian, J. W. 66-M, 240-M, 245-M, 270-N
Christianson, H. B. 190-K
Chu, P. K. 304-L
Chuang, Y. C. 126-M
Chubb, W. 1054-Q
Chuchmarev, S. K. 421-P
Chudoba, Karl F. 313-N
Chudzio, Boleslaw 49-A
Chung, S. Y. 76-F, 480-G
Church, F. L. . . . 331-E, 317-T, 26-V
Churcher, B. G. 64-A
Churchward, P. E. 2-C
Chute, George M. 179-M
Chvorinov, Nickolaj 91-N
Chyle, John J. . . . 660-K, 663-K, 757-K
Cibula, A. 191-E, 625-E
Cichelli, A. E. 30-F
Cimini, L. N. 373-S
Cimino, A. 400-P
Cina, B. 331-M
Cirilli, Vittorio 398-D
Cirou, Marcel 107-C, 213-Q
Clabaugh, W. Stanley 80-C
Clack, B. N. 433-S
Claesson, G. 377-S
Clamer, G. H. 245-E
Clapp, E. A. 91-K, 550-K
Clarebrough, L. M. 623-Q
Clark, C. L. 248-Q
Clark, D. 433-M
Clark, Daniel 210-T
Clark, D. D. 834-L
Clark, D. S. . . . 382-A, 359-K, 882-Q
Clark, Hale A. 206-F
Clark, H. W. 101-S, 144-S
Clark, J. W. 1073-Q
Clark, Lewis Jesse 24-B
Clark, M. E. 308-Q, 651-Q
Clark, R. 476-M
Clark, Ralph A. 92-Q
Clark, Walter E. 593-L
Clarke, Edward N. 146-P
Clarke, Frank E. 132-R
Clarke, J. 30-M
Clarke, S. G. 462-L, 464-L, 103-R, 289-R, 231-S, 233-S
Clas, G. 635-E, 75-Q
Clason, Clyde B. . 177-K, 300-K, 427-K
Claude, Maurice 116-H
Clauser, H. R. 296-K, 267-S
Clauss, Francis J. 152-A
Clay, Forrest P. 220-P
Clearman, H. E. 341-S
Cleary, Howard F. 51-T
Clease, A. G. Douglas 456-T
Cleaver, F. T. 38-F
Cleaves, H. E. 447-Q
Clegg, John W. 357-B
Clegg, P. L. 566-P, 325-S
Clem, Arthur G. 630-E
Clement, J. R. 148-P
Clements, P. G. 753-L
Cleveland, E. Lynn 181-M
Clews, C. J. B. 190-Q, 326-Q
Clews, H. W. 602-L
Cline, James E. 293-L
Clippeleir, C. de 383-D
Clipson, E. 347-E
Cloizbeaux, Jacques Legrand des 526-P
Close, Gilbert C. . . . 111-E, 329-E, 359-E, 608-E, 70-F, 168-G, 316-G, 318-G, 332-G, 396-G, 123-K, 157-K, 728-K, 100-L, 138-L, 254-L, 256-L, 372-L, 446-L, 507-L, 531-L, 987-L
Clothier, W. K. 366-P
Clusius, Klaus 285-P
Coates, C. 214-F
Cobb, Joseph R. 54-R
Cobo, Jose Izaguirre 684-K
Cochardt, A. W. 805-Q
Coche, A. 847-L
Cockburn, K. O. 25-B
Cockrell, William S. 43-T, 164-T, 293-T, 7-V
Cocks, M. 844-Q
Code, C. J. 302-S
Coe, Herbert L. . . . 374-R, 491-R
Coghlan, H. H. 172-A
Cohen, Morris 236-J, 207-M, 15-N, 139-N, 145-N, 183-N, 314-N, 207-R, 489-R
Cohen, Paul 8-A
Coheur, P. 240-D, 25-R
Colby, Malcolm Y. 180-P
Colclough, T. P. . . 26-B, 74-B, 242-B
Cole, Edward N. 174-T
Cole, H. 166-M
Cole, H. G. 416-L, 417-L, 418-L, 454-L, 457-L, 472-L
Cole, Sandford S. 19-B
Colegate, G. T. 16-J, 38-J, 59-J, 224-L, 513-L, 690-L, 937-L
Coleman, C. F. 52-B
Coleman, E. H. 326-A

Coleman, L. H. 338-D
Coleman, Wells 454-Q
Coles, B. R. 226-P
Collari, N. 144-R, 242-R, 344-R
Colle, A. 324-L
Collet, Emilienne 545-L
Collins, F. R. 126-L
Collins, J. F. 995-L
Collins, J. H. 462-R
Collins, S. C. 52-Q
Collins, W. Leighton 49-Q
Collinson, K. H. 216-E
Collongues, R. . . 477-M, 106-N, 138-R
Colner, William H. . . 788-L, 2-R, 107-R
Colombani, Antoine 582-L, 92-N
Colombier, L. 162-T
Coltart, R. F. 4-A
Colteryahn, L. E. 124-Q
Coltman, R. R. 84-N
Colton, R. A. 33-M
Colwell, A. T. . . 72-G, 220-G, 399-G
Colwell, Donald L. 426-Q
Colwell, L. V. 405-G
Combs, Eugene L. 485-L
Comeaux, Roy V. 461-R
Comenetz, G. 328-E
Comerford, F. M. 49-S
Comhaire, Jean-Jacques 456-M
Compton, K. G. 195-R
Comstock, G. F. 777-Q
Conacher, H. J. M. 160-E
Conciatori, A. B. 235-K
Conger, G. A. 27-N, 808-Q
Congreve, W. K. A. 1052-Q
Conlogue, J. 256-G
Conn, G. K. T. 355-M
Conn, Willi M. 72-K
Connolly, M. 383-L
Connor, C. 12-B
Conover, W. B. 337-P
Conrad, F. 24-H
Constantine, L. R. 514-K
Contini, Roberto 39-Q
Contractor, G. P. 120-A
Convey, J. 198-A, 173-P
Conway, Martin J. 326-D
Conwell, E. M. 549-P, 594-P
Coobs, John H. 50-H
Cook, A. J. 394-M
Cook, D. L. 1021-Q
Cook, E. L. 250-P
Cook, M. 37-Q, 438-Q
Cook, M. A. 216-B, 59-C, 77-P
Cook, N. H. . . . 407-G, 408-G, 494-G
Cook, P. M. 164-F
Cook, R. M. 292-N, 290-S
Cook, W. B. . . . 298-L, 338-L, 166-R
Cooke, Strathmore, R. B. 104-B, 122-B, 279-B, 370-B
Cooley, Charles M. 82-T
Cooley, K. D. 483-S
Coombs, A. G. H. 521-G
Cooper, A. L. 124-Q
Cooper, H. G. 563-P
Cooper, J. A. 279-E, 532-K
Cooper, J. E. 3-A
Cooper, J. H. 186-K, 252-R
Cooper, W. E. 430-Q
Cope, Stanley R. 57-G
Copeland, G. G. 120-B
Coppins, W. C. 416-S
Copson, H. R. 323-R, 402-R
Coquand, M. 233-F
Corak, William S. 116-P
Corbeau, William C. 303-E
Corcoran, James 56-Q
Cordner, G. D. P. 23-C
Cordwell, F. I. 35-D
Corea, T. 361-D
Corey, C. L. 81-M
Corey, D. H. 140-J
Corey, Richard C. 493-R
Corfield, Guy 794-L
Corkum, R. W. 295-P
Corlett, E. C. B. . . . 170-T, 223-T
Cornell, R. C. 82-E
Cornell, W. E. 106-R
Cornish, F. H. 45-P
Corral, Francisco Munoz del 66-N, 109-P
Corral, Joseph S. . . . 338-G, 377-G
Corten, H. T. 308-Q, 651-Q
Cothay, Frank H. 165-V
Cory, Charles R. . . . 211-G, 236-G
Cosslett, V. E. 179-M
Cotsworth, John L. . . 3-T, 527-T
Cotton, P. 445-P, 450-P
Cottin, Maurice 168-N
Cottrell, A. H. 312-Q, 708-Q
Cottrell, C. L. M. . . . . 122-K, . . 418-K, 534-K, 680-K, 766-K, 477-Q
Couch, Dwight E. . 592-L, 646-L, 679-L
Couchet, Georges 312-P
Coull, James 208-P
Courcel, Maurice de 294-Q
Couronne 347-S
Courtel, R. 263-M, 440-M
Courtheoux, M. J. 138-F
Cousans, F. 457-E, 617-E
Cover, Martin L. . . . 290-A, 226-B
Cowan, J. C. 639-L
Cowell, A. T. 810-Q
Cowling, J. E. 913-L
Cox, Dillon 108-F
Cox, F. G. 784-K
Cox, G. L. 18-V
Cox, H. L. 998-Q
Cox, H. W. 406-S

Cox, L. L. 470-E
Coxey, James R. 318-T
Crafts, Walter 61-D, 904-Q
Craig, G. B. 476-M
Craig, R. S. 469-M, 65-P
Craig, Susan L. 77-H
Craig, W. J. 686-Q
Craighead, Charles M. 260-A, 447-G, 883-Q
Craik, R. L. 51-H
Crain, L. S. 258-Q
Cramer, R. E. 259-Q, 136-S
Crampton, D. K. 194-V
Crancher, D. W. 705-Q
Crandell, Melvin G. 83-L
Crane, L. S. 193-R
Crangle, J. 36-N, 129-N
Cranmer, W. W. 589-L
Cranston, J. P. 51-H
Crawford, Alan E. 293-K
Crawford, J. 677-K
Crawford, Joe H. 340-G, 381-G
Crawley, R. H. A. 407-S
Crede, Charles E. 114-A
Creighton, H. Jermain 360-P
Cremer, E. 24-H, 414-M
Cresswell, R. A. 144-N
Crewdson, E. 61-T
Crewdson, P. E. F. 61-T
Critchell, Laurence . . . 200-F, 149-V
Crittenden, E. C., Jr. 97-P
Crocker, Bunting S. 219-B
Croft, G. M. 354-B
Croft, N. 156-E
Croft, R. C. 161-C, 162-C
Crook, A. W. . . . 549-Q, 579-Q, 325-S
Croom, E. A. G. . 11-L, 385-L, 790-L
Crosby, C. D. 209-V
Crosby, V. A. 27-Q
Cross, H. C. 482-Q, 494-Q, 592-Q, 835-Q
Cross, R. H. 591-Q
Crossley, F. A. 35-E
Crowell, Albert D. 204-P
Croxson, C. 528-K
Cruickshank, D. W. J. 337-M
Cruse, J. 165-S
Cruse, W. J. 260-Q
Crussard, C. 61-Q, 333-Q, 660-Q, 1035-Q
Cservenyak, Frank J. 95-A
Cubberley, W. A. 85-A
Cubicciotti, Daniel 171-P, 75-R, 110-R, 152-R
Cueilleron, Jean 9-C
Cuff, F. B. 470-M
Cuke, N. H. 105-J
Cullen, O. E. 26-J
Culp, L. D. 4-F
Cunningham, R. L. 282-M, 398-M
Cupps, C. C. 127-A
Curran, R. M. 384-K, 594-K
Curran, S. C. 177-P
Currie, J. 345-E
Curry, W. H. 2-C
Curtiss, W. E. 512-G
Cuscoleca, Otwin 358-D
Custer, James R. 387-E
Cuthbert, J. R. 55-D
Cuthbertson, J. W. 606-K, 478-L, 570-L, 861-L, 144-N, 267-Q
Cuzzer, Otto 739-L
Czaplicki, Léon 186-G, 239-G
Czyzewski, Harry 110-Q

D

Daane, A. H. 105-C, 546-K
Dagan, Barney 132-D
Dague, J. O. 226-D
Dahl, Theodor 203-F
Dahlstrom, D. A. . . . 106-B, 305-B
Dalbey, George E. 307-E
Dale, D. R. 307-F
Dale, J. J. . . 99-L, 384-L, 929-L, 827-Q
Dale, John 29-H
Dalhammar, Sven 202-B
Dalitz, V. Ch. 250-M
Dallavalle, J. M. 128-H
Dalmasso, Auguste . . . 93-T, 262-T
Dalton, C. A. 161-V
Dammel, H. W. 129-J
Dammer, A. 941-Q, 38-T
Damon, Samuel 389-K
Danehower, Rhodes 213-G
Daniel, S. G. 81-P
Danielson, Carl G. 668-L
Danielsson, C. 23-D
Danil'chenko, N. M. 135-N
Danilov, V. I. 185-M
Danilov, V. N. 143-Q
Danko, S. F. 409-T
Dannat, C. W. 118-C
Danne, A. H. 519-S
Danon, Jacques 519-L, 849-L
d'Arcambal, Alexander H. . 62-A, 49-V
Darcy, G. A. 234-S
Darken, L. S. 154-D, 258-N, 7-P
Darmann, Otto 549-S
Darmois, E. 281-P
Darnis, Isidro Sans 64-F
Das, D. K. 430-M
Dassetto, G. 235-R, 333-R
Dattisman, E. J. 100-D
Daum, W. 513-Q
Dauncey, G. B. 450-G
Daunt, J. G. 583-P
Daurat, Jean 767-L

Dautzenberg, Wilhelm 155-C
Dauvergne, Jean 319-F
Davenport, Wm. F. 77-E, 431-E
Davey, John S. 511-K, 542-K
David, Jean-Pierre 581-L, 278-P
Davidenkov, N. N. 352-Q, 469-Q
Davidson, Arthur W. . . . 206-L, 207-L
Davidson, C. F. 49-B
Davidson, J. F. 453-Q
Davidson, J. R. 75-E
Davies, C. B. 97-Q
Davies, D. E. 19-R
Davies, D. R. G. 62-P, 237-P
Davies, F. C. 210-D
Davies, H. Leighton 154-F, 161-F, 165-F
Davies, J. M. 192-J, 335-T
Davies, L. J. 64-A
Davies, Max 252-T, 400-T
Davies, M. H. . . . 115-M, 229-R, 230-R
Davies, T. H. 306-P
Davis, A. F. 590-K
Davis, A. J. 50-Q
Davis, C. L. 196-G
Davis, E. A. 654-Q, 674-Q
Davis, Edwin 79-J, 438-Q
Davis, E. F. 547-K
Davis, E. T. 331-A, 399-S
Davis, G. R. 379-R
Davis, H. C. 219-R, 220-R
Davis, Helen M. 55-V
Davis, H. M. 304-L
Davis, Howard T. 618-L
Davis, Hubert W. 95-A
Davis, Noah S., Jr. 192-T
Davis, R. J. 117-M
Davison, Charlotte Meaker . . 426-P
Davoine, Francois 520-L, 120-M
Davy, J. R. 302-M
Davydenko, I. D. 474-K
Dawihl, Walther . . 42-H, 110-H, 293-M
Daws, F. L. 260-D
Daws, L. F. 172-D
Dawson, M. H. 125-N
Day, Clyde W. 71-R
Day, Emmett E. 19-Q
Deale, Robert Corey 44-G
Dean, K. C. 123-B
Dean, Reginald S. 78-B, 107-V
Dearle, Denis A. 230-G
Deas, Herbert D. 339-M
DeBaene, E. C. 102-T
DeBeck, M. A. 313-E
Debenham, W. S. 102-B
DeBruyn, C. A. L. 257-R
de Bruyne, N. A. 32-K
Debye, P. P. 549-P
De Carli, F. 144-R, 344-R
DeCoulon, Philippe . . . 122-P, 176-T
de Courcel, Maurice 294-Q
Decroly, C. 122-C
Dedieu, J. 378-M, 63-N, 89-N
Deegan, J. E. 227-B
de Fleury, R. 784-Q
Defranoux, J. M. 528-R
DeGarmo, E. Paul . . . 174-J, 747-K
de Graaf, J. E. 49-S
De Greve, L. 422-L, 500-L
De Groat, George H. 176-G, 462-G, 463-G, 465-G, 130-K
Dehlinger, U. 255-M, 24-N, 236-N, 315-Q
DeHuff, P. G. . . . . 231-G, 234-G, . . 264-G, 319-G, 342-G, 114-V, 132-V
Deibler, R. H. 180-N
Deily, R. L. 549-K
Deisinger, W. 380-M, 77-Q, 172-V, 184-V
Deitrich, J. A. 161-V
DeJager, W. G. R. . . 39-C, 508-Q, 919-Q
Dekeyser, Willy 93-N
Dekhtiar, I. Ia. 102-N
Dekhtiar, L. M. 164-P
Dekhtiar, M. V. 164-P
DeKlyn, J. H. 48-A
Delahay, P. . . . 314-P, 315-P, 316-P
Delahay, Paul 506-R
Delaney, J. B. 623-L
Delaunay, M. 41-S
Delavault, Robert E. 170-B
DeLazaro, D. J. 76-N
Delbart, Georges 72-Q, 112-Q, 177-Q, 336-Q
Delcamp, Andre 307-T
deLeiris, H. 254-Q, 161-S
Dell, C. C. 45-B
Delmonte, John 194-V
Delong, H. K. 100-R
DeLonge, K. A. 27-N
Delport, Vincent 430-E
Demachi, Shigemitsu 98-G, 50-J
Dembski, T. A. 14-L, 337-L
Demel, Adolf 127-H
Demer, L. J. 687-Q
Dem'ianchak, A. S. 357-S
Demicheli, W. 252-E
Deming, W. Edwards 281-B
Demler, M. W. 413-E, 474-E
DeMuth, Edw., Jr. 718-K
Denker, Rolf 1036-Q
Denman, H. J. 140-J
Denne, Arthur G. 33-K, 80-K
Dennis, W. E. . . . 253-B, 179-N, 276-N
Dennis, W. H. . . . 146-C, 38-Q, 90-V
Dennison, T. 253-D
Denny, John P. 58-M

De Padua, Ciro T. 189-A
de Paulin, J. J. Meynis 167-K
Depew, B. W. 275-J
DePierre, Vincent 432-E
Derby, G. Palmer 371-E
Derge, G. 253-B
Deringer, W. A. 131-L, 90-R
Derlong, H. 368-E
de Salins, Rene 471-P
Descamps, ... 735-L
Desesa, M. A. 346-S
de Souza Santos, Tharcisio D. 85-C, 86-C, 87-C
Dessau, G. 291-B
de Strycker, Robert 140-Q
Dettner, Heinz W. .106-L, 814-L, 972-L
Detwiler, D. P. 335-P
Detweiler, J. C. 244-B
Dever, Frederick S. 442-K
Deverall, J. E. 206-P
Devereux, W. C. . . 35-A, 77-A, 535-T
Devernay, E. 150-D
Devienne, Marcel 319-L
Devies, M. 206-T
Devilder, P. 471-S
DeWald, L. H. 452-E
Dewez, J. J. 493-E
Dewhirst, D. W. 14-M, 218-M
DeWitt, C. C. 139-A
Dews, J. W. 396-E
Dexter, D. L. 243-P, 373-P
D'Eye, R. W. M. 359-M
Diamond, R. W. 333-A, 203-B
Dick, J. 434-Q
Dick, J. N. 318-T
Dick, Walther 187-D
Dickason, A. 223-G
Dickel, G. 97-M
Dickenscheid, W. 202-N
Dickerson, P. B. 690-K
Dickinson, A. 708-K
Dickinson, Thomas A. . . . . 166-E, 393-E, 469-E, 564-E, . .226-G, 332-G, 568-K, 749-L, 148-V
Dickinson, W. A. 189-F
Dickson, J. Home 326-K
Diehl, H. A. 443-M
Diehl, Jorg 563-Q, 1046-Q
Dienes, G. J. 486-Q
Dietl, Martin G. 322-E, 587-E
Dietz, Albert G. D. 559-K
Dietze, Horst-Dietrich 301-Q
Dietzel, A. 350-L, 951-L
Diev, N. P. 530-R
Digby, P. K. 251-G
Diggers, T. G. 756-Q
Digges, Thomas G. 51-Q, 538-Q, 631-Q, 657-Q, 1016-Q
Diggin, Myron B. 344-L, 445-L
Dijkstra, L. J. . . 274-Q, 483-Q, 502-Q
Dilling, E. D. 135-F
Dingle, R. B. 256-P, 274-P
Dinglinger, E. 343-G
Dinichert, P. 99-Q
Dinsdale, C. 77-A
Dipert, James E. 21-K
Diran, Loris M. 309-E
Dismant, John H. 100-B, 165-C
Dixon, C. R. 690-K
Dixon, D. 177-P
Dixon, H. E. 240-K
Dixon, P. A. 345-K
Djernaes, E. 635-E
Djingheuzian, L. E. 259-B
Dmitriev, I. S. 369-K, 402-K
Doat, Etienne 489-Q
Doat, R. 313-E
Dobbs, E. R. 132-P
Dobis, G. R. 143-J
Dodd, J. N. 255-P
Dodd, R. A. 411-Q, 530-Q, 1051-Q
Dodero, Maurice 147-C, 234-R
Dodge, Barnett F. 358-A, 379-A, 158-S, 212-S
Dodson, D. A. 92-C, 108-C
Dodson, Roy E., Jr. 469-R
Doe, Edwin W. 214-E
Doepken, H. C. 201-Q
Doerner, H. A. 293-B
Dohrmann, H. 575-K
Dolan, Thomas J. 372-Q, 395-Q, 634-Q, 656-Q, 681-Q
Dolkart, I. S. 293-D
Doll, D. T. 15-E
Domagala, R. F. 113-Q
Domb, C. 29-P
Domes, Viktor 24-F
Dominik, E. A. 413-L
Donald, Andrée 5-D
Donilova, A. I. 185-M
Donner, S. B. 128-E, 390-E
Donney, J. 177-D
Donoho, C. D. 135-E
Donovan, B. 24-P, 478-P
Donovan, L. B. 79-L, 831-L
Dorenfeld, Adrian C. 16-B
Doring, H. 414-P
Dorman, O. N. 167-R
Dorn, J. E. . . . . 441-Q, . . 609-Q, 610-Q, 611-Q, 884-Q, 900-Q
Dörnen, A. 461-K
Dorner, Stefan 194-P
Dorvel, A. A. 98-E
Doscheck, Antony 64-S, 403-S
Doty, W. D. 649-Q
Doucet, M. 38-M

Dougherty, S. J. 103-D
Douglas, Gordon S. . . . 130-L, 399-L
Douglas, Thomas B. 118-P
Douty, Alfred 278-L
Dow, Norris F. 239-Q
Dowd, J. D. 778-K
Dowie, J. C. 258-E
Downie, C. C. 124-A, 3-B, 5-B, 31-C, 40-C
Downing, Herb 195-K
Downs, K. W. 87-B
Doyle, W. M. 6-V
Drabers, C. W. 97-D
Drachmann, J. 125-E, 422-Q
Dragge, O. 23-D
Drahos, F. R. 344-K, 645-K
Drain, J. 187-P, 576-P
Drakin, S. I. 116-C
Draper, C. R. 8-L
Dravnieks, Andrew 35-R
Drechsler, M. 318-M
Dreher, G. M. 323-D
Drenning, John F. 563-E
Dressler, L. E. 550-T
Dreyer, K. L. 233-J
Dreyfus, L. A. 268-J
Drickamer, H. G. 72-N, 126-N
Driscoll, W. J. 39-E, 341-E
Dromgoole, W. V. 310-P
Drufuca, M. 252-E
Drumare, P. 631-K
Drummond, H. D. 187-K
Drury, M. D. 23-S
Drury, P. H. 396-E
Druyvesteyn, M. J. 26-P, 920-Q
Dube, Arthur 14-N
Dube, C. A. 61-N, 191-Q
Dubinin, G. N. 747-L, 106-M, 407-M, 278-N, 280-N
Dubois, M. 145-T
Dubrovskii, V. G. 258-P
Duc, F. S. 429-L
Ducommun, Paul 169-R
Dudzinski, N. 1001-Q
Duflot, Jean 108-N
Dufour, Ch. 448-P
Dufour, M. F. 121-B
Dufty, Norman F. 70-D
Dugas, Claude 526-P
Dugdale, R. A. 480-P
Duhautois, Thérese 192-L, 134-P
Duley, D. W. 375-D
Dulis, E. J. 274-N, 606-Q, 676-Q, 868-Q, 989-Q
Dumbleton, M. J. 1075-Q
DuMond, T. C. 70-A, 368-A, 77-T, 154-V
Dunbar, A. F. 359-A
Duncan, J. M. 158-M
Duncan, R. C. 252-Q
Dunicz, Boleslaw L. 330-P
Dunlap, W. C., Jr. 166-N
Dunlop, A. 623-E
Dunlop, P. J. 270-B
Dunn, C. G. 39-N, 441-P
Dunn, J. H. . . . 300-T, 523-T, 536-T
Dunn, P. A. 183-L
Dunnington, B. W. 43-R
Dunphy, R. P. 85-E, 297-E, 511-E, 34-N
Dunoyer, Louis 67-L
Dunsheath, Percy 230-A
Dunsmuir, P. 358-M
Du Pleissis, D. J. 60-B
duPont, B. T. 57-H
Durdin, Ia. V. 59-R, 397-R
Durelli, A. J. 40-Q
Durkin, A. E. 381-Q
Durr, Heinrich 357-G
Durrer, Robert . . 236-D, 369-D, 374-D
Dutilleul, H. 254-Q
Dutta, R. K. 334-A
Duwez, Pol 106-H, 60-M, 61-M, 237-M, 246-M, 175-N, 257-N
Dwyer, Pat 220-D, 6-E, 153-E, 201-E, 355-E, 616-E
Dyachenko, P. E. 340-S
Dyer, A. R. 98-R
Dyke, R. H. 59-E

E

Eade, R. W. 50-V
Eadon-Clarke, C. E. . . 715-K, 213-T
Eagon, T. E. 176-E, 257-E, 47-Q
Eakin, C. T. 127-V
Earle, Fred M. 205-L
Earley, C. C. 2-N
Eash, J. T. 615-Q
Easley, J. K. 822-L
Eastman, L. R. 115-L
Eastwood, L. W. . 66-E, 308-E, 311-E, 388-E, 521-E, 553-E, 128-Q, 482-Q
Eaton, E. P., Jr. 570-T
Eaton, I. D. 87-Q
Eberius, E. 112-S
Eberle, F. 386-R
Eborall, Myriam D. 625-E
Eccleston, J. 533-L
Eckart, Otto 646-E
Eckel, E. J. 22-J
Eckel, John F. 600-Q
Eckerbom, N. G. 207-K
Eckert, Roger E. 72-N, 126-N
Ede, Richard H. 430-S
Eddy, W. P., Jr. 214-R, 168-T, 215-T, 385-T

Edeleanu, C. 18-R, 351-R
Edens, W. W. 530-E
Edgerton, A. F. J. 20-D
Edmunds, I. G. 141-M, 285-N
Edwall, Carl 772-K
Edwards, A. R. 221-T, 152-V
Edwards, C. A. 364-D
Edwards, Donald A. 469-M
Edwards, James W. . . . 209-P, 106-S
Edwards, J. O. 755-Q
Edwards, W. A. 272-L
Eeckhout, J. 165-S, 412-S
Eeles, Charles C. 125-J
Effertz, K. H. 259-K, 521-K
Egeler, Carl E. 236-L
Eger, Georg 141-C
Eggleton, A. E. J. 439-P, 535-P
Eggleston, R. R. 197-J
Egido, Jose Antonio Bressel . . 168-E
Ehrenberg, Donald M. 509-R
Eichelman, G. H., Jr. 255-N
Eicke, H. 588-P
Eickhoff, A. J. 127-R
Eickhoff, Klaus 190-N
Eickner, H. W. 545-K
Eickworth, Erwin 289-D
Eide, Owen F. 691-Q
Eilender, Walter 272-J, 342-Q
Eiselt, Bruno 346-P
Eisenhuth, Clemens 273-J
Eisler, Stanley L. . . . . . 574-L, ...666-L, 83-S, 455-S
Ekey, David C. 71-E
Ekstein, Miriam G. 338-M
Elistratov, P. S. 372-K
Elkina, T. A. 417-P
Elling, R. E. 603-Q
Ellenburg, Janus Y. 59-S
Elliot, G. D. 141-D, 144-D
Elliot, R. A. 283-B
Elliott, E. 58-V
Elliott, E. D. 44-D
Elliott, J. F. 297-D
Ellis, Alfred L. 357-M
Ellis, Almont 421-R
Ellis, E. B. 516-S
Ellis, F. 241-F, 295-F
Ellis, S. G. 323-M, 425-M
Ellis, W. C.. 81-M, 196-Q, 536-Q, 599-Q
Ells, C. E. 123-M
Ellsworth, E. M. 258-J
Ellwood, C. 20-H
Ellwood, E. C. 79-M, 328-M, 330-M, 453-M
Elly, L. P. 131-G
Elmer, David A. 752-K
Elsasser, H. 398-K
Elsea, A. R. 147-N, 91-Q
Elstad, R. T. 107-A
El Wakkad, S. E. S. . . . 307-P, 310-R
Elwers, George 156-G, 282-G
Ely, F. G. 386-R
Ely, Ralph, Jr. 402-P
Elze, J. 352-L, 955-L, 313-R, 184-S, 387-S
Emara, Sayeda H. 310-R
Emerick, H. B. 378-D
Emerson, R. W. 181-J, 246-K
Emery, E. M. 106-K
Emery, R. St. J. 331-S
Emick, O. 247-F, 264-F
Emigh, C. R. 407-P
Emley, E. F. 251-R
Emmanuel, G. N. 157-N
Emmerich, J. P. 135-K
Ende, Hans vom 190-P
Eney, W. J. 46-R
Eng, J. W. 528-T
Engel, A. L. 236-B, 371-B, 1-C
Engel, Edward 310-L
Engel, Max 256-M
Engelhardt, Werner 159-Q
Engell, H. J. 335-R
Enghag, Per 381-S
England, Frank E. 111-L
English, G. C. 430-R
English, R. H. 209-K
Enos, H. A. 101-T
Ensminger, Dale 418-S
Entin, R. I. 99-N
Epelboin, I. 490-L, 948-L, 231-P, 279-P, 340-P
Epifanov, G. I. 171-G
Eppelsheimer, D. S. . . . 271-M, 533-Q
Epprecht, W. 297-Q, 519-R
Epremian, E. 680-Q, 706-Q
Epstein, George 559-K
Erdmann, R. . . . 359-L, 494-L, 654-L
Erdmann-Jesnitzer, Friedrich 180-K, 412-P
Eremeev, M. A. 151-P
Erenburg, R. Z. 115-B
Ergang, Richard 197-P, 464-Q, 939-Q, 1018-Q
Erich, Earl A. 575-L
Erickson, James L. . . . 34-E, 141-E
Erickson, L. E. 230-M
Erickson, Stephen E. . . . 160-B, 265-B
Ericson, G. L. 518-R
Erker, A. 464-K
Ernst, Hans 47-G, 452-G, 453-G
Erokhin, A. A. 271-K
Erra, A. 1088-Q
Erwall, L. G. 266-P
Eshbach, Ovid W. 269-A

Eshman, Andrew N. 375-G
Esin, O. A. . 268-B, 232-P, 347-P, 515-P
Esling, Robert H. . 169-P, 380-P, 496-P
Estermann, I. 127-P, 358-P, 398-P, 501-P
Etchison, O. D. 744-K
Eudier, M. 98-N
Eugene, F. 512-Q
Euler, J. 122-S
Eusner, G. R. 102-B
Evangelides, Harry A. . . 635-L, 826-L
Evans, A. A. 531-E
Evans, B. S. 469-L
Evans, C. J. 77-J
Evans, D. J. 626-L, 119-S
Evans, E. L. 6-D, 8-D
Evans, E. R. 29-E
Evans, F. C. 88-E, 570-E
Evans, G. B. 1-G
Evans, G. E. 634-L, 134-T
Evans, G. L. 152-C
Evans, H. T., Jr. 338-M
Evans, J. C. 257-S
Evans, L. S. 1002-Q
Evans, N. L. 849-L
Evans, R. M. . . . 62-M, 90-P, 549-T
Evans, Robley D. 426-P
Evans, U. R. . . . . 518-L, 538-L, 721-L, 18-R, . . 19-R, 22-R, 65-R, 123-R, 225-R, . . 227-R, 231-R, 515-R, 534-R, 541-R
Evans, W. M. 1077-Q
Evans, W. W. 425-P
Everest, A. B. 101-E, 264-E, 128-V, 173-V
Everhart, John L. 158-J, 264-J, 210-L, . . 436-L, 204-Q, 532-T, 23-V, 111-V
Ewart, T. G. 212-B
Ewing, C. T. 64-P
Ewing, D. T. 834-L
Ewing, Fred J. 435-M
Ewing, J. F. 804-Q
Ewing, Scott P. 10-R
Eyring, LeRoy 264-P

F

Fabens, A. L. 7-H
Fabriani, Ferrucio 60-K
Fabrykowski, Z. J. 226-J, 604-K
Fackert, Walter 958-L
Fadgen, T. J. 339-A
Fageant, Jacqueline 81-M
Faguet, J. 519-K
Fahlenbrach, Hermann 191-P
Fainshtein, S. M. 104-M
Fairbank, Henry A. 335-P
Fairfield, H. H. 72-E, 91-E, 273-E, 427-E
Fairhurst, W. 203-J
Fairservice, G. 346-K
Falconer, S. A. 260-B
Falkenburg, L. B. 639-L
Falkenhagen, Günter 149-M, 188-N, 1036-Q
Fal'kevich, A. S. 115-K, 272-K, 377-K, 492-K, 302-Q
Fancutt, F. 805-L
Fangemann, M. Gerard . . 135-T, 299-T
Fanning, Frank H. 274-A, 250-F
Farber, Milton 509-R
Farnsworth, H. E. 146-P, 147-P
Faroni, Charles F. 340-T
Farrer, T. W. 108-R
Farrington, G. C. 592-K
Farrow, Lewis C. 3-L
Farthing, T. W. 309-L
Fassell, W. Martin 165-C
Fast, J. D. . . . . 83-N, 124-N, . . 318-N, 274-Q, 344-Q, 483-Q, 502-Q
Fastie, William G. 4-S
Fastov, N. S. . . . 279-N, 725-Q, 931-Q
Faulkner, L. A. 445-G
Faulkner, V. C. 241-E, 276-E
Faust, C. L. 173-L, 392-L
Favre, M. G. 165-J, 166-J
Fay, Charles R. 331-L
Fay, M. A. 11-D
Faye, J. 196-A
Fayles, Robert R. 227-B
Faymonville, W. J. 465-T
Fealdman, H. 958-Q
Fearfield, G. W. 344-E
Fearnehough, T. D. . . . 152-Q, 392-Q
Fearnside, K. 24-S
Featherly, R. L. 432-R
Fedock, M. P. 147-D
Fedotov, L. E. 121-K
Fegert, G. 325-T
Feher, Joseph de 489-G
Feigen, Morris 966-Q
Feigenbaum, S. 367-B
Feitknecht, W. 81-R, 82-R
Feldman, Charles 339-F
Feldman, M. M. 158-G
Feldmann, Werner 349-D
Feldmeier, J. R. 15-P
Fel'dshtein, Ia. I. 275-G, 133-N
Felix, W. 536-S
Felix, W. A. 189-K, 634-K
Fell, E. W. 7-M
Fellom, Roy 257-G
Felloni, Liliana 998-L
Fellwock, Elroy 213-K
Felt, J. O. 590-E

Feltham, Paul 60-Q, 643-Q
Feng, I. Ming 984-Q
Fenn, A. P. 217-E, 270-E, 493-Q
Fenner, A. J. 526-Q
Fentiman, W. P. 438-Q
Ferguson, Charles A. 305-F
Ferguson, R. H. 105-D
Ferguson, W. B. 87-F
Fern, K. A. 105-B
Fernier, M. 144-T
Ferradini, Christiane 519-L
Ferrand, M. Georges 946-Q
Ferrente, Corrado 8-C
Ferri, Antonio 32-R, 454-R
Ferro, A. 406-P, 547-R
Fetterolf, L. D. 93-C
Fetters, Karl L. 123-D
Few, W. E. 114-M, 77-N
Fieber, H. 150-P
Fiedler, W. 258-T
Field, Alexander L. 21-B
Field, E. N. 145-E
Field, J. E. 998-Q
Field, Mary Jane 5-M
Field, Michael 205-G, 232-G
Field, Samuel 73-L
Field, T. G. Scott 171-K
Filer, E. W. 154-D, 7-P
Finan, F. B. 16-R
Finch, G. I. 574-Q, 1002-Q
Fincham, C. J. B. 498-S
Findley, W. N. 229-Q, 415-Q, 684-Q, 1069-Q
Fine, M. E. 493-P, 198-Q
Fine, M. M. 192-B, 256-B
Fine, S. 14-L
Fink, Kurt 178-D, 343-Q, 715-Q
Fink, William C. 90-T
Finkelnburg, Hans H. 187-G
Finlay, Gordon R. 284-B. 120-C
Finlay, Keith F. 79-T
Finlay, W. L. . . . 9-M, 195-M, 51-V
Finlayson, D. M. 551-P
Finley, J. A. 287-A
Finnie, I. 494-G
Finniston, H. M. . . 152-Q, 392-Q, 201-V
Finsterwalder, N. J. 268-Q
Fischer, Erwin 216-D
Fischer, H. 670-L, 953-L, 323-P, 313-R
Fischer, J. 168-S
Fischer, J. Else 313-R
Fischer, R. B. 199-Q
Fischer, W. 84-C
Fischer, Wilhelm Anton 190-P
Fisher, C. 189-T
Fisher, Ernest F. 152-E
Fisher, J. C. . . . 17-N, 198-N, 441-P, ... 323-Q, 431-Q, 994-Q
Fisher, R. M. 86-M, 125-M
Fisher, S. A. 124-C
Fisher, Thomas F. 117-N
Fisher, W. A. P. 591-Q
Fitzer, Erich . . 276-J, 651-L, 969-L
Fitzgerald, E. B. 234-K
Flamant 736-L
Flanagan, John M. 402-S
Flanagan, R. 240-N
Flanigan, A. E. 106-K, 107-K, 419-K, 610-K
Fleming, Arthur 64-A
Fleming, L. W. 117-D
Fleming, M. G. 258-B
Fletcher, E. E. 147-N
Fletcher, G. C. 224-P
Fletcher, Stewart G. 148-J, 302-N, 217-T
Fleury, R. de 784-Q, 370-T
Flinn, R. A. 78-E
Flint, R. V. 78-D
Floe, C. F. 284-M, 470-M
Flood, H. 229-B
Florentin, J. J. 595-P
Florio, John V. 65-M, 353-M
Floyd, J. 143-K, 421-K
Floyd, R. W. . . 300-M, 325-M, 441-M
Fluck, P. G. 594-Q
Flugge, S. L. 808-L
Fly, Paul V. 253-F, 280-F
Foerster, E. 371-T
Foex, Marc 411-M
Foley, R. T. 822-L
Folkhard, Erich 557-Q
Fomina, M. A. 361-R
Fontaine, C. B. 49-T
Fontana, J. C. 44-K
Fontana, Mars G. . . . . 881-Q, 13-R, 36-R, 43-R, 51-R, . . 52-R, 60-R, 93-R, 151-R, 205-R, . . 264-R, 326-R, 424-R, 487-R, 532-R
Foot, Norman J. 48-B
Ford, H. 241-F, 295-F
Ford, J. G. 785-L
Forder, H. 62-V
Foreman, A. J. E. 329-Q
Forestier, Hubert 200-J
Fornaci, C. 293-Q
Fornander, S. 23-D
Forrest, P. G. 694-Q
Forrester, P. G. 395-E, 267-Q
Förster, D. F. 162-S
Forster, Fritz 355-S
Forsyth, P. J. E. 702-Q
Forsyth-King, R. O. 70-B
Fortier, A. 458-G
Fortino, D. 396-D
Forty, A. J. 150-N, 284-N
Foster, F. G. 233-M

Foster, G. 166-F
Foster, G. G. 541-Q
Foster, L. S. 303-B, 254-T
Foster, N. C. 73-Q
Foster, William 24-Q
Fotiadi, A. 462-Q
Foulke, C. D. 115-Q
Fournet, Gerard 215-N
Fournie, R. G. 193-K
Fourrier-Savornin, France . . 409-P
Fowler, C. A., Jr. 309-P
Fowler, R. T. 52-D, 200-D, 322-D, 49-S
Fox, F. A. 52-V, 125-V
Frager, M. 826-L
Frail, Earl H. 388-G, 277-K
Frame, Lorne 107-F
Fran, Charles E. 586-K
France-Lanord, Albert 282-A
Francis, C. B. 30-D
Francis, Howard T. 788-L, 2-R, 107-R, 194-V
Francis, W. E. 427-R
Franck, R. J. 613-E, 569-K
Frank, Charles 26-G
Frank, F. C. 281-N, 43-Q, 310-Q, 314-Q, 318-Q
Frank, Ralph H. 303-S
Franke, Erich . . 393-R, 37-T, 269-T
Frankel, Egmont 155-A
Frankel, J. J. 60-B
Frankhouser, W. L. . . . 157-N, 158-N
Franklin, A. W. 11-Q
Franklin, F. F. 243-D
Franks, E. H. 82-K
Franssen, H. . . . 39-H, 102-H, 274-M
Fransson, Stig 483-E
Franz, Nehl 1039-Q
Franz, W. F. 770-Q
Fraser, J. P. 495-R
Fraser, O. B. J. 110-V
Fraunberger, Friedrich 390-P
Frazier, R. H. 113-M
Frear, Clyde L. 79-E
Frede, L. 603-E
Frederic, G. L. 135-F
Freeman, J. W. . 148-N, 171-Q, 240-Q, 458-Q, 637-Q, 777-Q, 804-Q, 899-Q
Freeman, Robert B. 158-S
Frei, M. 805-K
Frenay, Eugene 154-C
French, Richard C. 525-R
Frére, A. 47-L
Frerkiks, Rodger 913-L
Freudenthal, Alfred M. 688-Q
Freundlich, W. . . 320-B, 128-C, 135-C
Frey, D. N. 130-N, 171-Q, 240-Q, 458-Q, 637-Q, 675-Q
Frey, Karl 716-K
Frey, Muir L. 78-T
Frey, R. 396-K
Freyberger, Wilfred L. . . . 66-B, 365-B
Freyer, G. 381-M
Fricke, H. 523-K, 101-M
Fricke, W. 463-K
Fridman, Ia. B. 727-Q
Fridman, Ya. G. 118-Q, 119-Q
Friedberg, A. L. 820-L
Friedberg, S. A. 127-P, 501-P
Friedel, J. 140-M, 565-P
Friedli, J. 519-R
Friedman, Herbert 89-F
Friend, J. Newton 88-A
Friend, W. Z. 15-R, 294-T
Frier, W. T. 297-A
Frigot, G. 31-T
Frisbie, W. J., Jr. 329-D, 357-D, 392-D
Frischman, T. A. 262-J
Frisk, Erik E. 768-K
Fritts, Harry W. 187-V
Fritze, Hans Werner 442-S
Frocht, Max M. 404-Q, 837-Q
Frohnmeyer, Gerhard 722-Q
Fromm, E. A. 549-T
Fromm, E. O. 62-M
Fromm, O. M. 733-K
Frommer, D. W. 192-B, 256-B
Frost, L. 75-L
Frost, N. E. 1053-Q
Frumkin, A. N. 513-P
Fry, H. L. 619-Q
Fry, S. L. 342-S
Fryer, E. M. 309-P
Fuchs, E. 602-K
Fuchs, R. 670-K
Fukuda, Yoshiichi 243-N
Fukuda, Yoshuchi 468-P
Fukuroi, Tadao 243-N, 467-P, 468-P, 495-P, 210-Q
Fukushima, Toshiro . . . 919-L, 981-L
Fulda, H. W. 123-C
Fuller, C. S. 221-P
Fuller, R. L. 806-K
Fuller, Wayne R. 600-L
Fullerton, J. R. 623-K
Fullman, R. L. 17-N, 192-N
Fulton, Robert 57-H
Fultz, S. C. 253-P
Funahashi, Wataru 160-L
Funk, C. W. 20-B
Funk, E. R. 457-K, 553-K, 11-P, 308-P, 393-Q
Furbish, Charles O. 302-L
Furey, John J. 89-S
Furkert, Paul A. 72-B
Furman, D. E. 383-M, 442-Q
Fuschillo, N. 599-P

Futaki, Kunio . . 74-M, 181-Q, 182-Q
Fyffe, R. J. 543-S

G

Gabler, Paul 172-G
Gaebe, Philip A. 2-D, 94-D
Gagne, A. F., Jr. 825-Q
Gagnebin, A. P. 615-Q, 116-V
Galey, M. J. 42-S
Galkin, M. E. 244-P, 57-T
Gallistl, Erich 458-M
Gallmann, F. 519-R
Galloway, C. D. 382-E
Galt, J. K. 414-Q
Galton, F. T. 51-K
Gammeter, Elmer 161-V
Gann, M. B. 492-K
Ganzhorn, K. 258-M
Gapchenko, M. N. 714-K
Garchenko, M. I. 368-K
Garcon, R. 65-J
Gard, C. M. 7-A
Gardam, G. E. 44-H,
. . . . 7-L, 27-L, 463-L, 477-L, 371-S
Gardner, Frank S. 18-K
Gardner, H. H. 68-T
Gareis, Fritz 228-D
Garfunkel, M. P. 15-P, 239-P
Garling, R. A. 712-L
Garnier, Henry 634-E
Garofalo, F. 622-Q, 870-Q
Garrett, A. B. 249-P, 352-R
Garriott, F. Emery 133-K
Garrison, J. L. 17-S, 46-S
Garrod, R. I. . . . 183-M, 198-M, 709-Q
Gascuel, Louis . . 97-F, 101-J, 368-T
Gasilova, E. B. 175-M, 177-M
Gastoué, D. Y. 628-K
Gates, William B., Jr. 321-A
Gatos, Harry C. 312-R
Gatti, Marco 285-F
Gatto, F. 467-Q, 169-S
Gaudin, Antoine M. . . . . .
. . . 66-B, 92-B, 278-B, 344-B, 365-B
Gaughan, Philip J. 407-R
Gaume-Mahn, Francoise. 445-E, 572-P
Gauthier, Gaston 547-S
Gauvin, W. H. . . . 176-L, 178-L, 964-L
Gauzit, Maurice 131-M, 227-M
Gavrilov, L. K. 232-P, 515-P
Gayley, C. T. 82-K
Gazara, C. P. 296-N
Gazard, J. S. 102-F
Geach, G. A. . . . 645-L, 2-M, 235-M
Gealy, E. J. 95-A
Geballe, T. H. 303-P
Gebhardt, Erich . 194-P, 345-P, 347-Q
Gee, Cyril C. 616-K
Geehan, Robert W. 95-A
Geerlings, H. G. 773-K
Gegeler, C. George 74-J
Geibig, F. C. 364-K
Geiger, Th. 515-Q
Geil, Glenn W. 421-Q,
. . 538-Q, 657-Q, 758-Q, 905-Q, 997-Q
Geiling, L. 123-S
Geisler, A. H. . . . . .
. . . 169-M, 13-N, 38-N, 79-N, 194-N
Geist, C. M. 176-S
Geithmann, Harriet 480-T
Gel'd, P. V. 421-P, 457-P
Gelderman, C. 568-T
Geleji, Alexander 226-F
Gel'man, A. S. 432-K, 478-K
Gemant, Andrew 348-R
Gence, P. 209-N, 226-N
Geniesse, J. C. 543-R
Gentner, Fr. 247-J
Gentieu, Norman P. 143-L, 209-L, 316-L
Gentilini, L. 359-R
Gentry, C. H. R. 415-S
Georg, Karl 549-S
George, P. F. 443-M
George, Waller 625-Q
Gerard, George 273-Q
Gerbeaux, H. 217-Q
Gerber, Walter O., Jr. 237-S
Gerds, A. F. . . . 12-M, 31-M, 188-M
Gerhardt, Otto . 325-L, 31-R, 481-R
Gerischer, Heinz 221-N
Gerken, John M. 245-K, 667-K
Gerold, V. 529-S
Gerritsen, A. N. 4-P
Gerritsen, W. 724-K
Gerspacher, G. 755-K
Gerstenkorn, Horst 188-P
Gertsman, S. L. . . . . .
. . . . . 149-A, 198-A, 63-E, 235-Q
Geschelin, Joseph . . . . . .
. . . . . 288-F, 289-F, 300-F, 67-G,
. . 430-G, 196-J, 330-K, 672-K, 457-T
Getselev, Z. N. 476-K
Getzin, Edmund E. 154-A
Gevers, Michel 234-F
Gevers, R. 347-M
Ghaswala, S. K. . . 336-T, 364-T, 553-T
Ghosh, P. K. 361-A
Giaccone, Davide 1090-Q, 491-T
Giacobbe, J. B. . . 234-J, 379-T, 560-T
Gialdini, Thomas 125-F
Giambomi, Louis A. 562-P
Giauque, W. F. 303-P, 397-P
Gibadlo, Frank 192-E
Gibbons, D. F. 378-Q

Gibbs, H. L. 96-B
Gibbs-Smith, A. J. 213-D
Gibson, G. J. 185-K, 249-K
Giddings, H. 67-K
Gifkins, R. C. 303-M, 287-Q
Gijsman, H. M. 453-P
Gilbert, H. L. . . 73-C, 110-C, 153-C
Gilbert, Lew 73-K
Gilbert, N. H. 196-L
Gilchrist, J. K. 541-Q
Gilchrist, Raleigh 80-C
Giles, P. G. 932-Q
Gill, Stanley A. 329-S
Gillanders, E. B. 23-B
Gillespie, J. S. 92-V
Gillespie, Ralph G. 565-T
Gillham, E. J. 485-P
Gillings, D. W. 239-B, 141-D
Gillis, J. 165-S, 412-S
Gilman, John J. 32-N, 44-Q, 249-Q, 1070-Q
Gilpin, W. C. 155-V
Gilson, J. 217-S
Gimmel, Paul . . . 299-Q, 346-Q, 719-Q
Gindin, L. G. 146-R, 147-R, 248-R, 249-R, 279-R
Gingerich, E. M. 145-J
Ginneken, A. J. J. van 341-M
Ginstling, A. N. 36-H
Gintsburg, Ia. 488-K
Ginzburg, V. L. 418-P
Girardi, D. J. 296-D
Girshig, R. 33-H, 126-H
Gisler, H. J. 234-B, 247-B
Gitzen, W. H. 88-V
Gladyshevskii, E. I. . . . 178-M, 410-M
Glage, W. 711-K
Glaisher, W. H. 150-Q
Glaser, Frank W. . 54-H, 173-M, 238-M
Glass, E. M. 94-R
Glassenberg, Marvin 13-C
Glaubitz, Heinz 864-Q, 1044-Q
Glaus, E. 56-T
Glaza, G. K. 141-V
Glebov, L. V. 371-K
Gledhill, P. K. 75-B, 141-D
Gleekman, L. W. 634-L
Gleichmann, Hubert 114-B
Gleitz, K. 863-Q
Glen, J. D. 388-T
Glen, R. C. 287-B
Gleszer, Kenneth M. 91-H
Glick, H. L. 548-P
Glickman, Sidney H. 373-L
Glinkov, M. A. 266-D
Glocker, Richard 1066-Q
Glockner, Richard 235-N
Gobrecht, H. 389-P
Gobus, Alexander 518-S
Goche, O. 47-L
Gockstetter, George J. 338-D
Godard, Hugh P. 410-R
Godding, R. G. 144-E
Gödecke, W. 261-D
Godfrey, Douglas 142-P, 397-Q
Godfrey, Howard J. 1029-Q
Godfroid, H. 369-T
Goemann, R. P. 133-T
Goepfert, George 35-J, 70-J, 90-J, 106-J, 120-J
Goertz, Matilda 94-P, 234-P
Goetzel, Claus G. 13-H, 56-H
Gofman, P. B. 158-G
Gofner, A. M. 481-K
Goglia, M. J. 206-P
Goheen, John L. 418-E
Gohn, G. R. 599-Q
Gokcen, Nevzat A. 91-P
Goldberg, Bernard 738-Q
Goldberg, C. 463-M, 289-S
Goldberg, D. C. 214-G, 231-G, 234-G, 264-G, 319-G, 342-G
Golden, John J. 76-D
Golden, Lex B. 423-R
Goldhoff, R. M. 447-G
Goldman, I. 983-L
Goldman, J. E. . 126-P, 127-P, 501-P
Goldman, Manuel 877-Q
Goldschmidt, Emil 508-R
Goldschmidt, H. J. . . . 249-M, 127-N
Goldsmith, J. R. 90-Q
Goldsmith, Werner 117-Q
Goldstein, H. 523-R
Golovintsev, M. G. 483-K
Gomer, Robert 540-P
Gonser, Bruce W. 33-Q, 549-T, 160-V, 202-V, 204-V
Gonya, Harold J. 71-E
Gonzales, F. 16-S
Goodall, A. 318-D
Goode, Henry P. 423-S
Goodeve, Charles 292-T
Goodford, J. A. 7-K, 281-K
Goodman, David 413-S, 552-S
Goodridge, B. E. 626-Q
Goodwin, H. B. 799-K
Goodwin, Karl P. 194-V
Goodwin, W. M. 211-B
Gopp, A. I. 57-T
Goraetskii, N. I. (Also Goraytskii) 46-L, 367-L
Göransson, Olof 47-E
Gorayetski, N. I. 46-L, 367-L
Gordet, A. 322-L, 348-L
Gordon, Joseph 305-P
Gordon, S. A. 245-T

Gorman, J. 215-E
Gornyi, N. B. 211-M
Gorokhov, V. A. 117-K
Gorton, R. E. 21-Q
Goss, A. J. 250-N, 320-N
Goss, Alexander E. 9-A
Goss, Norman P. 480-Q
Goss, William M. 350-A
Gossard, Myron L. 592-P
Gotal'skii, Iu. N. 267-K
Gotberg, H. H. 374-G
Gottardi, M. T. 103-M
Gottardi, V. 325-N
Gottfeld, F. H. 110-S, 261-S
Gotz, W. 450-E
Götzl, F. 237-L
Gould, Arthur F. 89-A
Gould, Gordon I. 368-B
Gould, R. K. 422-G
Gourlie, William H. 304-S
Goutel, F. 132-Q
Gouzou, J. 1086-Q
Graafe, R. J. Van de 212-P
Grabovskii, M. A. 391-P, 392-P
Graef, Rudolf 24-D, 167-D
Graf, Ludwig 47-N, 112-N
Graf, Ulrich 249-S
Gragnani, A. 102-M
Graham, A. 279-Q
Graham, A. K. 128-A, 224-A, 415-L, 807-L
Graham, H. F. 427-E
Graham, Herbert W. 75-D
Graham, J. D. 160-J, 220-J
Graham, John W. 81-V
Graham, J. P. 335-B
Graham, Ralph H. 941-L
Graham, R. P. 463-S, 542-S
Grainger, J. A. 121-G, 268-G
Granby, Paul 8-F, 149-F
Grand, J. A. 64-P
Grand, L. 14-C, 61-C, 443-E, 620-E, 653-E
Grandpierre, Maurice 1085-Q
Graneek, M. 492-S
Granjon, Henri 717-K, 184-M
Granke, R. C. 425-P
Grant, Donald 56-G
Grant, J. W. 269-N, 148-Q
Grant, Nicholas J. 194-M, 284-M, 470-M, 331-P, 444-Q, 534-Q, 866-Q, 901-Q
Grant, Will C. 162-E
Granville, J. W. 486-P, 487-P
Gratsianskii, N. N. 247-R
Gray, Albert Woodruff 675-L
Gray, Allen G. 360-A, 18-L, 102-L, 140-L, 235-L, 345-L, 447-L, 511-L, 633-L, 643-L, 688-L, 776-L, 923-L, 989-L, 545-T
Gray, J. H. 22-L, 449-L
Gray, J. S. 212-F
Gray, P. M. J. 25-C, 30-C, 56-C
Grebenkemper, C. J. 371-P
Green, A. E. 275-Q
Green, Edwin F. 14-J
Green, H. W. 529-K
Green, John R. 338-D
Green, Leon, Jr. 962-Q
Greenaway, H. T. 1-M, 326-M
Greenberg, H. 327-S
Greenberg, Simon A. 20-K
Greenburg, R. H. 16-R
Greenfield, H. H. 286-B
Greenfield, P. 159-M
Greenhouse, Harold M. . . . 164-Q, 499-R
Greenlee, R. H. 83-E
Greenlee, S. O. 579-L
Greenough, A. P. 1023-Q
Greenough, G. B. . 68-Q, 736-Q, 1084-Q
Greenwood, F. H. 254-S
Greenwood, H. W. 182-A, 10-H, 31-H, 97-H, 641-K, 531-T, 68-V
Greenwood, J. Neill 886-Q
Gregg, H. T., Jr. 119-J
Gregor, Edwin 491-S
Gregory, E. 81-F
Gregory, E. D. 137-N
Greiner, E. S. 536-Q
Gresham, H. E. 902-Q
Greve, E. M. 259-S
Greyson, F. R. 8-B
Gridley, A. 193-T
Gries, H. 352-E, 551-E
Griese, F. W. 258-K
Griffen, John 346-B
Griffin, W. B. 156-A
Griffith, Charles R. . . . 44-A, 178-A
Griffiths, H. W. 534-E
Griffiths, Leslie H. 21-R
Griffiths, T. A. 258-L
Griggs, John O. 67-D
Grigsby, C. E. 73-D
Grilliat, Jacques 101-Q
Grim, R. E. 74-E
Grimal, Marcel 32-T
Grindrod, J. 232-T
Grinsfelder, Henry . . . 327-K, 329-L
Griswold, R. W. 584-E
Griswold, T. N. 157-R
Grjotheim, K. 229-B
Grobe, Arthur H. 3-H, 90-H, 99-H, 239-J, 878-Q

Grodzinski, P. . . .642-Q, 1005-Q, 1065-Q
Groetzinger, Gerhart . . 211-P, 291-P
Gronegre, H. W. 150-J
Gronegress, Hans Wilhelm . . . 280-J
Groom, H. 26-S
Grootenhuis, P. 433-P
Grosjean, Carl C. 93-N
Gross, Bernard 807-Q, 74-R
Gross, Lewis H. 565-E
Gross, M. R. 598-Q
Gross, Nicol 839-Q
Grosse, A. V. 449-S
Grossman, N. 429-G, 166-Q, 506-Q, 908-Q, 1072-Q
Grossmann, M. A. 156-J
Grot, A. S. 410-E
Groth, Willis G. 804-K
Grove, C. S., Jr. 634-L, 543-T
Grover, H. H. 245-T
Grover, H. J. 73-J, 285-Q
Grover, LaMotte 44-J, 35-K
Groves, R. 423-E
Groves, Wilson T. 188-J, 760-Q
Grube, K. 128-Q, 168-Q, 482-Q
Grube, William L. 10-M, 108-M, 324-M
Gruberg, Leon D. 190-L, 872-L
Grubitsch, Heribert . . . 27-R, 30-R
Gruca, E. 526-R
Grudov, P. P. 276-G
Gruhl, Ursula 294-R
Gruhl, W. 151-M, 113-N, 294-R
Grum-Grzhimailo, N. V. 107-P
Grun, Paul 217-F
Grunberg, L. 546-P
Grunberg, M. 205-E
Grunberg, R. . . . . 43-E, . . 208-E, 446-E, 503-E, 633-E, 306-T
Grunder, Werner 267-B
Grundig, Werner . . 21-J, 32-P, 952-Q
Grüner, Paul 112-F
Grungo, Guiseppe 49-D
Grupp, George 388-L
Grüss, H. 184-S, 387-S
Gruzin, P. L. 100-N
Guarnieri, G. J. 670-Q
Guba, F. A. 256-F
Gubkin, S. I. 71-F
Gude, William G. . 611-E, 725-K, 559-T
Gudge, A. W. 448-L
Gudtsov, N. T. 106-M
Guebely, M. El. 847-L
Guedras, Andre 380-E
Guedras, Marcel . . 124-B, 300-D, 92-J
Guerci, C. 547-L
Guest, Gordon H. 152-S, 190-S
Guggenheim, E. A. 603-P
Guilanitskii, B. S. 131-C
Guilhaudis, Andre 388-R
Guillaud, Charles 181-P
Guillemot, Raymond 376-E
Guillet, L. 209-N, 226-N
Guinard, Charles 629-K, 630-K
Guinier, André . 93-M, 96-M, 314-M, . . 320-M, 412-M, 248-N, 282-N, 711-Q
Gulbransen, Earl A. 465-R, 503-R, 504-R
Guliaev, A. P. 117-J
Gummer, W. K. 358-B
Gunn, J. B. 600-P
Guntermann, Wilhelm 236-R
Gunther, F. 412-P
Gunther, G. G. 218-B
Gurevich, G. I. 400-Q
Gurevich, S. E. 728-Q
Gurland, Joseph 429-M
Gurski, Joseph 252-R
Gurtler, G. 864-L
Guseva, E. A. 110-K
Gusmer, F. E. 771-L
Gut, E. 149-K, 754-K
Guthmann, Kurt 263-D
Gutmann, F. 539-P
Gutsula, N. A. 954-Q
Guttman, L. 82-M
Guy, Albert G. 223-M
Guyer, E. 166-J
Guyot, E. 175-T
Guyot, F. 233-K
Guzov, S. G. 66-G, 227-G
Gwathmey, A. T. 575-Q
Gyorgy, E. M. 521-P

H

Haaijman, P. W. 83-F
Haarmann, ... 743-L, 745-L
Haase, Ludwig Werner . 586-L, 70-R
Haasen, P. 465-Q, 1067-Q
Habraken, L. 348-M
Hack, C. H. 75-V
Hackerman, Norman . 174-L, 270-L, . . . 87-P, 250-P, 401-P, 192-R, 403-R
Hadden, S. E. 380-R
Hader, Rodney N. 38-B
Hadfield, D. 356-T
Hadjispyrou, A. G. 913-Q
Haeffner, E. 559-P
Haefner, Albert J. 586-K
Haenel, Joao Gustavo 82-Q
Hagen, Curt 578-P
Hagen, John P. 371-P
Hagg, G. 361-M, 442-M
Hagihara, Hitosi 214-B, 215-B
Hagiwara, Toshiaki . . . 292-K, 183-R
Hague, John L. 61-S, 89-S
Hahne, K. H. 246-F, 499-T
Hain, G. M. 409-G

Haines, H. R. . . . 390-M, 391-M, 483-P
Haissinsky, M. 280-P
Hajnal-Konyi, K. 390-Q
Hajto, N. 163-E
Halfawy, M. 64-L
Hall, A. M. 387-R
Hall, A. R. 123-H
Hall, B. 902-Q
Hall, E. O. 439-Q
Hall, J. A. 193-T
Hall, John Howe . . . 270-D, 294-D, . . 32-E, 173-E, 245-E, 357-E, 391-E
Hall, J. R. 93-D, 250-D, 371-D
Hall, R. C. 214-P
Hall, R. G. 286-L
Hall, Robert E. 812-L
Hall, W. H. 16-M
Halla, F. 344-P
Hallam, F. L. 76-A, 352-A
Haller, C. T. 552-T
Hallett, M. M. . . 346-E, 103-J, 228-R
Halliday, I. M. D. 49-S
Halliday, W. M. . . . 119-A, 158-E, . .283-E, 399-E, 403-E, 170-K, 754-Q
Halls, E. E. 786-K, 25-L, 527-L, 921-L, 942-L
Halpern, J. 593-P
Halpern, L. 67-P
Halteman, Eber K. 124-M
Halter, A. C. 196-F
Hambling, P. G. 269-M
Hamburg, J. F. 875-Q
Hamilton, F. M. 166-B
Hamilton, J. Hugh 165-C, 58-M
Hamjian, H. J. 114-H, 707-Q
Hammond, Joseph P. 704-Q
Hammond, Rolt 420-K, 228-S
Hamon, B. V. 264-Q
Hanawalt, J. D. 37-A, 95-A, 96-A, 141-V
Hancock, A. 182-L
Hancock, P. F. 77-J
Handforth, J. R. . .148-K, 407-K, 770-K
Handley, J. L. 350-E
Handwerk, E. C. 93-C
Hanemann, Heinrich 447-M
Hanink, Herman H. . . . . 25-Q, . .496-Q, 273-T, 295-T, 355-T, 431-T
Hann, E. K. 672-Q
Hannahs, W. H. 528-T
Hannon, C. H. 510-R
Hans, A. 166-S, 210-S
Hansen, M. . . . . 236-M, 384-M, . . . 385-M, 387-M, 20-N, 76-N, 9-P
Hansen, Michael 347-D
Hanson, A. C. 279-L
Hanson, D. 126-E
Hanson, H. F. 126-A
Hanstock, R. F. 126-S
Happe, Ralph A. 33-Q
Harbach, G. L. 202-E, 333-E
Harden, G. D. 521-R
Harden, R. 73-P, 558-P
Harding, A. R. 189-M
Harding, H. V. 147-G
Hardrath, Herbert F. 120-Q, 1019-Q, 1071-Q
Hardy, H. K. . . . . 29-N, ... 138-N, 173-N, 267-Q
Hargreaves, F. . . 43-H, 288-R, 511-R
Hargreaves, L. 394-E
Harkins, Frank G. . . . 621-K, 657-K
Harley, T. H. 387-D
Harner, R. G. 450-K
Harper, John H. 85-A
Harrington, Joseph F. 307-B
Harris, Charles 506-L
Harris, Donald E. 816-L
Harris, G. B. 328-Q
Harris, G. T. 216-T
Harris, H. 307-K, 130-Q
Harris, H. E. 91-T
Harris, H. H. 248-E
Harris, Kenneth J. 811-Q
Harris, Kenneth S. 161-A
Harris, Louis 215-P
Harris, Margaret W. 111-P
Harris, N. D. B. 166-T
Harris, W. J., Jr. 419-Q, 742-Q
Harris, W. R. 520-S, 535-S
Harrison, E. G. 199-S
Harrison, Harvey T. 161-V
Harrison, Howard L. 150-F
Harrison, W. N. . . . . 4-L, 88-L, .168-L, 239-L, 308-L, 543-L, 501-L, . . 554-L, 557-L, 638-L, 729-L, 917-L
Harry, E. D. 52-M, 237-P
Hart, Edward W. 994-Q
Hartbower, C. E. 247-K, 703-K
Hartemann, M. 342-D
Harten, Karl P. 10-A
Hartleif, Gerhard 348-S
Hartley, H. J. . . . 80-J, 136-J, 628-L
Hartman, A. H. 901-L
Hartmann, E. C. . . 365-Q, 417-Q, 95-T
Hartmann, Hellmuth 16-C
Hartmann, Irving 26-H
Hartmann, Paul 120-L
Hartmann, W. 160-T, 214-T
Hartwell, R. R. 637-L, 227-T
Harvey, C. A. 197-S
Harvey, G. G. 521-P
Harvey, N. P. 111-B, 53-V
Harvey, R. F. 23-J, 37-J
Harwell, Richard H. 321-E
Harwood, Julius J. . .100-H, 28-V, 83-V

Hasiguti, Ryukiti Robert 66-Q
Haslem, M. E. 451-Q
Hass, Georg 442-P
Hastings, Carlton H. 38-S
Hatch, G. B. 408-R, 409-R
Hatchett, V. W. 158-R
Hatfield, George A. 625-K, 196-S, 219-S
Hatton, Harrison 21-A
Haufe, Willi 96-J, 45-V
Hauffe, K. 288-P, 335-R, 357-R
Hauger, Floyd M. 699-L
Haughton, M. A. 761-L
Hauk, Viktor 1061-Q
Haul, R. A. W. 309-M
Hauri, C. F. 43-A
Hausman, H. J. 402-P
Hauseman, Irwin K. 925-L
Hauttmann, H. 237-D, 543-K, 697-K, 951-Q
Havens, G. G. 71-K
Havens, R. 95-B
Havens, W. W., Jr. 277-P
Hawke, D. L. 127-R
Hawkes, M. F. 26-N, 192-Q
Hawkins, G. A. 206-P
Haworth, J. B. 287-M
Hay, R. H. 460-M, 536-R
Hayama, Fusao 15-G, 848-Q
Hayashi, Etsuo 98-G, 50-J
Hayashi, Ikuhiko 259-F
Hayes, D. A. 133-S
Hayes, E. T. 135-F, 41-M, 115-M
Hayman, R. F. 22-B, 40-B, 46-B
Haynes, J. R. 222-P
Haynes, R. 145-D, 251-D, 372-D
Hayward, Carle R. 298-A, 50-D
Hayward H. N. 128-R
Hayward, J. P. 584-K
Haywood, F. W. 77-J
Hazel, J. Fred 350-R
Hazelton, W. S. 214-G, 114-V, 132-V, 194-V
Head, Herberth E. 113-L, 856-L
Heal, H. T. 97-N
Hearmon, R. F. S. 521-Q
Heasman, N. 155-V
Heath, H. R. 49-N
Heavens, O. S. 733-L, 933-L, 22-N, 478-S
Hechtman, R. A. 416-Q
Hedde, F. 244-L
Hedgepeth, John M. . . . 122-Q, 971-Q
Hedley, C. S. 28-E
Hefele, Hermann 174-R
Heger, J. J. 261-J
Hehemann, R. F. 214-P
Heiberger, Phillip 881-L
Heide, John D. 306-S
Heidenreich, R. D. 157-M, 168-M, 327-P
Heiks, J. R. 249-P
Heiks, Ray E. 455-R
Heilig, Charles 249-D
Heiligenstaedt, Werner 37-B
Heilman, Charles W. 34-J
Heimann, W. 211-E
Heimerl, George J. 456-Q
Heimsoeth, W. 952-L
Hein, R. A. 524-P
Heindl, R. A. 586-E
Heine, R. W. 65-E, 89-E, 299-E, 425-Q
Heinrich, Kurt 25-D
Heinzinger, L. W. 298-D
Heinzman, Carl 153-A
Heischkeil, Werner 304-D
Heiss, A. 380-S
Heiss, John F. 208-P
Heldenfels, Richard R. 970-Q
Heller, Z. H. 49-P
Helling, W. 742-L
Helm, H. B. 197-F
Helme, William 621-L
Helmers, E. Neil 86-A
Helmkamp, R. F. 194-G, 353-G
Hempel, Max 465-M, 341-Q, 858-Q, 975-Q, 1043-Q
Hendershot, H. F. 189-F
Henderson, J. W. 563-P
Hendrickson, Alfred 118-J
Hendrickson, C. P. . . . 229-Q, 415-Q
Hendrickson, David 590-L
Hendrickx, Heinz 360-B
Hendry, D. R. 588-L
Henisch, H. K. . . 85-N, 486-P, 487-P
Henley, H. F. 291-L
Henley, V. F. 595-L, 898-L
Henning, Hans-Joachim 249-S
Henon, Guy 93-E
Henrion, E. 254-K
Henry, George E. 303-L
Henry, N. M. F. 224-M
Henry, M. Pierre 147-T
Henry, S. L. 480-S
Henry, W. G. 297-N
Henschen, Homer E. 106-S
Hensley, J. W. . . 676-L, 775-L, 977-L
Henzlik, W. C. 391-K, 650-K, 790-K, 318-L
Herasimchuk, M. V. 496-S
Herb, Charles O. 517-E, 379-G
Herbert, D. C. 361-Q, 542-Q
Herbert, R. M. 563-K
Herbiet, H. 324-D
Herbine, Stanley C. 373-A
Herbruck, C. G. 363-K
Herbst, H. T. 101-K, 172-K
Herdy, R. 344-P

Hereford, Frank L. 220-P
Heremans, F. 422-L, 500-L
Herenguel, J. . . 152-F, 649-L, 37-M, . . 92-M, 172-M, 316-M, 138-Q, 335-Q
Herington, C. E. 937-Q
Heritage, R. J. 387-T
Hermelin, Bo. 471-R
Hermes, G. 361-L
Herneryd, Olov 24-C
Herold, Edgar M. D. 49-F
Herold, Richard . . 316-E, 405-E, 505-E
Herre, Myron G. 38-B
Herres, Otto 38-A, 102-A
Herring, Conyers 229-N, 262-N, 348-P, 414-Q
Herrmann, E. 846-L
Herrmann, Robert H. 6-E, 116-E, 434-E
Herschenz, H. 225-E
Hersh, Herbert N. 291-N
Heselwood, W. C. 63-P
Hesling, S. 333-B
Hess, Frederic O. 183-J
Hess, James B. 182-N, 351-P
Hess, Manfred 72-L
Hess, R. E. 115-S
Hess, W. F. 170-Q
Hesse, A. H. 13-C
Hessenberg, W. C. F. . . . . 33-F, . . 78-F, 159-F, 207-F, 295-F, 205-Q
Heuer, R. P. 11-D
Heuertz, Matt 86-L
Heumann, Theo 241-R
Heuschkel, J. 656-K, 1025-Q
Heyes, J. 354-L, 355-L, 865-L
Heyman, J. 934-Q
Heyn, Henry M. 315-B
Heywood, R. B. 525-Q
Hibbard, W. R., Jr. . . . 266-Q, 324-Q
Hibbert, E. N. 121-D
Hibbes, W. 344-G
Hibdon, Carl T. 268-P
Hibi, Tadatosi 332-M, 424-M
Hickam, W. M. 142-S
Hickernell, L. F. 551-Q, 380-T
Hickling, A. 914-L
Hickman, William A. 239-Q
Hicks, Robert G. 701-L
Hickson, V. M. 693-Q
Hidnert, Peter 333-P
Hiers, G. O. 188-F
Hiesinger, L. 193-L
Higgins, A. K. 523-E
Higgins, Carter C. 455-G
Higgins, R. M. 468-T
Higgins, T. R. 692-K
Higgins, W. F. 251-R
Higgs, J. Y. 267-Q
Highley, Leonard, Jr. 363-R
Hilbert, Heinrich L. 507-G
Hildred, F. 287-L
Hile, H. H. 142-K
Hilgendorff, H. J. 308-T
Hill, E. G. 44-B
Hill, George Richard 364-R
Hill, Henry C. 392-S
Hill, J. Gilbert 558-E
Hill, R. 65-Q, 377-Q, 548-Q
Hill, Raymond P. 412-L
Hill, R. W. 216-P
Hill, T. E., Jr. 2-C
Hill, Thomas M. 555-T
Hill, V. J. 227-J
Hill, Walter P. 314-K
Hiller, J. E. 222-M
Hillert, Mats 212-M, 201-S
Hillesheim, Peter 745-L
Hillier, James 136-N
Hillson, P. J. 338-P
Hilsch, R. 287-P
Hilton, H. H. 965-Q
Hilty, D. C. 296-D
Himmel, L. 55-N
Hindbeck, Olof 942-Q
Hinde, R. M. 285-N
Hinds, E. G. P. 536-K
Hinds, Glenn U. 424-S
Hindson, Ralph D. 116-D
Hines, Edward 336-S
Hinman, C. W. . . . . 10-F, . . . 42-F, 68-F, 266-G, 301-G, 397-G
Hinnüber, J. . 344-G, 111-H, 13-V, 46-V
Hino, J. 95-C, 317-N
Hinst, H. F. 130-R
Hipperson, A. J. . . 354-K, 366-K, 388-K
Hirsbrunner, Fr. 261-T
Hirsch, P. B. 552-Q
Hirsch, Robert 291-K
Hirschfield, J. J. 494-K
Hirschy, Charles 181-T
Hirshfeld, J. F. 191-R
Hirst, A. 174-E
Hirst, W. 584-Q
Hiskey, C. F. 276-P
Hislop, W. B. 985-L
Hitchcock, O. W. 426-S
Hitchell, A. 542-S
Hitchen, A. 463-S
Hixson, A. Norman 133-C
Hoak, Richard D. 135-A, 241-A
Hoar, T. P. . . . . 21-H, 11-L, 309-L, 385-L, 529-L, . . 714-L, 790-L, 253-N, 227-R, 161-V
Hoare, F. E. 561-P
Hoare, W. E. 24-L
Hobson, J. D. . . . . 73-N, 172-N, . . . 292-N, 67-Q, 375-Q, 528-Q, 290-S

Hoby, T. J. 131-S
Hocart, Raymond 34-H
Hoch, Gustav 856-Q
Hochmann, J. 22-D
Hockett, John E. 669-K
Hodge, J. M. 211-J,
. . . . . 207-Q, 608-Q, 649-Q
Hodge, Philip G., Jr. 162-Q
Hodge, Webster 33-Q
Hodges, W. F. 161-V
Hodgson, C. C. 401-E, 203-J
Hodierne, F. A. 218-J
Hodshire, J. F. 94-B
Hoeltje, W. C. 1080-Q
Hoerni, J. 434-M
Hofbauer, Th. 38-P
Hofe, H. van 55-K, 661-K
Hoff, Hubert 71-S
Hoffman, C. A. 4-J
Hoffman, F. C. 373-G
Hoffman, James I. 24-B
Hoffman, R. E. 260-N
Hoffman, Raymond 3-H
Hoffman, William P. 2-K
Hoffmann, Werner 792-Q
Hofman, Adrian A. 116-S
Hofmann, Ernst-Gunter 722-Q
Hofmann, Ulrich 72-P
Hofmann, W. . . 188-G, 55-K, 578-K,
. 149-M, 188-N, 714-Q, 1036-Q, 248-S
Hogan, C. L. 85-P, 210-P
Holcroft, W. H. 121-J
Holden, A. N. . . . 185-N, 202-Q, 798-Q
Holden, H. A. 301-A
Holden, J. 419-M
Holdt, H. 944-Q
Holewinski, S. 32-B
Holgate, Sheila M. 5-S
Holik, L. 23-M
Holland, L. 142-L, 476-L, 536-L
Holland, Robert E. 268-P
Holler, H. D. 180-R
Holley, Charles E. 42-P, 590-P
Holley, Charles T., Jr. 428-P
Holliday, W. M. 5-E
Hollister, L. C. 694-K
Hollomon, J. H. . . . . .
. . . . . 354-M, 114-N, 198-N, 323-Q
Holloway, W. 732-L
Holmberg, E. G. 436-R
Holmes, D. T. 255-B
Holmes, D. W. 206-E
Holmes, H. 516-R
Holmes, H. J. 405-G
Holmes, J. R. 252-R, 365-T
Holmes, Tunis L. 222-D
Holmquist, J. L. 124-F
Holms, A. G. 1004-Q, 1020-Q
Holt, E. F. 250-K, 447-K
Holt, John P. 8-E, 130-E
Holt, J. R. 534-P
Holt, Marshall 87-Q, 417-Q
Holt, M. L. 171-L, 172-L, 857-L
Holub, E. M. 457-G, 495-G
Holzberger, Julius 37-G
Holzer, Carl 287-F
Holzhauer, Cl. 170-N
Holzworth, M. L. 13-R, 52-R
Homer, C. E. 218-J
Homes, G. A. 1086-Q, 179-S
Honnaker, L. R. 161-V
Hood, Robert T. 873-L
Hood, T. A. 117-L, 572-L, 763-L
Hook, Ira T. 103-K, 637-K
Hooper, F. C. 324-P
Hoopes, L. N. 92-K
Hope, D. E. 651-E
Hopkins, B. E. 53-D, 201-D, 13-Q, 151-Q
Hopkins, I. L. 520-Q
Hopkin, L. M. T. 503-Q
Hopkins, M. R. 626-L
Hopper, Bayo 692-Q
Hopper, T. R. 899-L
Hoppmann, William H. . . 763-Q, 961-Q
Horak, Frank A. 235-P
Horalek, K. 82-B
Horko, William N. 227-B
Hörmann, E. . . 242-F, 228-K, 554-K
Horn, Elizabeth 312-N
Horn, F. Hubbard 16-P
Horn, F. W. 329-T
Horn, Herbert E. 573-L
Hornak, John A. 95-D
Horspool, J. M. 441-E
Horst, R. L. 263-R, 430-R
Horstman, C. C. . . 112-P, 504-P, 540-T
Horstmann, Dietrich 289-M
Horvath, L. 307-R
Hoschek, Erhard 444-S
Hose, A. G. 119-F, 3-R
Hoselitz, K. 228-P, 474-P
Hosler, W. R. 462-T, 515-T
Hosoi, Yoshikazu 254-J
Hothersall, A. W. 27-L, 473-L
Hotop, Werner 130-H
Hotson, C. V. . . 129-C, 130-C, 641-E
Houben, K. 552-E
Houdremont, Eduard 297-R
Houldcroft, P. T. . . . . .
. . . . . 148-K, 216-K, 406-K, 770-K
Housner, Henry H. 68-H
Houston, E. G. . . 130-Q, 606-Q, 868-Q
Houston, W. V. 404-P
Hovel, Theodor 558-T
Hovis, James E. 3-F
Howard, Darnley M. 641-Q

Howard, Joseph F. 317-G
Howard, Karl S. 557-E
Howard, Lawrence A. 765-L
Howat, D. D. 68-D, 51-H
Howe, William A. 429-R
Howell, F. M. . . 748-K, 487-Q, 616-Q
Howell, R. P. . . . 13-P, 140-P, 460-R
Howson, H. O. 12-D, 102-E
Howlett, B. W. 1075-Q
Hoyt, Q. B. 86-Q
Hozik, John 95-A
Hsiao, C. M. 75-P
Hu, Hsun 41-N, 163-Q
Hu, L. W. 875-Q
Hubbard, Floyd 204-L
Hubbard, Willard D. 24-B
Hubbell, A. H. 269-B
Hubbell, Wilson G. 1-L, 10-L, 136-L, 51-S
Huber, Elmer J., Jr. 42-P, 428-P, 590-P
Huber, R. F. 331-G
Huck, George 815-Q
Huddle, Franklin P. 165-A
Hudimac, A. A. 97-P
Hudson, F. 77-A, 276-E
Hudson, J. C. . . . . 369-A, . . 12-L, 674-L, 805-L, 113-R, 26-T
Hudspeth, W. R. 304-B
Huebler, Jack 30-J
Huff, G. F. 534-S
Huff, H. J. 536-R
Huffman, C. J. 190-F
Huffman, J. W. 156-Q
Hug, H. 159-C, 394-L, 76-Q
Huggenberger, A. U. 219-Q, 388-Q, 558-Q
Huggins, Robert A. 502-S
Hughes, Arthur V. 328-P
Hughes, C. H. 300-N
Hughes, David 302-N, 1057-Q
Hughes, D. E. R. 391-Q
Hughes, M. L. 760-L
Hughes, W. P. 545-Q
Hujaak, K. L. 379-R
Hulf, H. J. 6-G
Hull, F. C. 85-J, 255-N, 672-Q
Hull, L. W. 134-E, 512-E
Hull, W. G. 148-K, 406-K, 770-K
Hulm, J. K. 227-P, 540-P
Hülsbruch, Walter 18-J, 95-J
Hulse, C. 315-T
Hultgren, Axel . . . 88-J, 133-J, 68-N
Hultgren, Ralph 445-M
Hulthen, S. I. 115-H
Humble, H. A. 89-R
Hume, David N. 386-S, 486-S
Humenik, Michael, Jr. 885-L
Hume-Rothery, W. . . . 117-M, 191-M, 287-M, 329-M, 392-M, 393-M, 444-M
Hummel, Benjamin L. 170-V
Hummitzsch, Werner 465-K, 848-L, 494-T
Hunger, Johanna 440-S
Hünnebeck, E. 142-T
Hunnicutt, Horace A. 953-Q
Hunt, G. A. P. 158-Q
Hunt, H. K. 680-L, 920-L
Hunter, Frank B. 695-L
Hunter, J. 65-A
Hunter, J. L. 123-F, 172-F
Hunter, John 370-E
Hunter, R. 161-V
Huntington, H. B. 261-N
Huppert, Paul A. 163-L
Hur, J. J. 271-R, 415-R
Hurd, Dallas T. 124-H
Hurt, Tom 466-S
Hurum, Fredrik 312-E
Hurwitz, J. K. 173-P, 390-S
Huseby, R. A. 481-Q
Husson, G. 149-D, 166-D, 177-D, 320-D
Huston, K. M. 369-R, 513-R
Hutchinson, E. F. 439-K
Hutchinson, F. W. 246-P
Hutchinson, W. R. 246-K
Hutchinson, T. S. 399-M
Hutt, E. T. 801-Q
Hutter, Luis 386-D
Huttig, G. F. 35-H, 76-H
Hutto, E. 644-Q
Hyam, E. D. 276-M
Hyatt, E. C. 91-G, 254-G
Hyde, Reed W. 168-B
Hyland, J. L. 108-D
Hyler, John E. 711-L
Hyler, W. S. 285-Q
Hyslop, James 288-K
Hyslop, Marjorie R. 218-A

I

Iampol'skii, B. Ia. . . . 423-Q, 795-Q
Iavoiskii, V. I. 457-P
Ichida, Masakazu 446-R
Ickert, J. 746-L
Ignatowicz, S. 80-P
Iguchi, Nobuhiro 367-M
Iitaka, Ichiro . . . . . 545-E, ... 364-M, 6-N, 488-P, 6-R, 445-R
Ikeda, Ken 553-Q
Imai, Yunoshin 212-Q
Imai, Yutaka . . 292-K, 370-Q, 183-R
Imhoff, R. N. 698-Q
Imhoff, Wallace G. 516-L, 607-L, 698-L, 791-L
Immel, R. B. 517-P
Imperati, J. 103-K, 637-K

Imshennik, K. P. 432-K
Imura, Tohoru 421-M
Ince, Charles R. . . 95-A, 186-A, 217-A
Indelli, Antonio . . 395-L, 172-R, 275-R
Ineson, E. 153-Q
Ingalls, H. W. 222-L
Ingols, Robert P. 230-T
Ingraham, T. R. 516-P
Inouye, H. 121-P
Inskep, H. V. 42-J
Inukai, Takeshi 851-Q
Iofa, Z. A. 510-P
Ipsen, A. O. 96-B
Ipsen, Harold N. 265-J
Irish, Carolyn R. 171-M, 216-M
Irish, Ruth I. 170-B
Irmann, Roland 2-H, 28-H, 125-H, 1064-Q, 199-V
Irvine, K. J. 227-N
Irving, Ralph 354-G
Irwin, G. R. 253-Q
Irwin, Henry 146-F
Irwin, L. K. 252-Q
Irwin, O. W. 188-Q
Isaev, A. I. 372-G
Isakova, S. B. 782-K
Isenberg, S. 114-J
Ishizaki, Tetsuro 212-Q
Isobe, Mitsutake 345-M, 246-N
Ito, Osamu 98-S
Itterbeek, A. Van 422-L, 500-L
Itzel, Morris 338-E
Iuganova, S. A. 137-M
Iurovskii, A. Z. 223-B
Ivanick, W. 54-H
Ivanov, A. A. 26-M
Ivanov, G. P. 365-L
Ivanov, O. S. . . . 47-M, 136-P, 161-P
Ivanov, V. K. 468-K
Ivanova, L. I. 61-P
Ivantsov, G. I. 110-E
Ivantsov, G. P. . . 103-N, 205-N, 365-P
Iverson, F. K. 357-M
Iwase, Keizo 186-N
Iyengar, M. S. 317-B
Izumi, Osamu 343-M

J

Jack, K. H. . 30-M, 335-M, 35-N, 129-N
Jackson, A. 51-D, 223-D, 379-D
Jackson, Clarence E. 137-K
Jackson, D. A. 545-P
Jackson, Howard E. . . . . 116-A, 350-G, 438-G, 287-K, 516-K, 588-K, 598-K, 649-K, . . 699-K, 731-K, 791-K, 264-L, 489-L
Jackson, H. R. 810-Q, 543-R
Jackson, J. H. 387-R
Jackson, L. R. . . 15-Q, 284-Q, 285-Q
Jackson, M. D. . . 418-K, 680-K, 766-K
Jackson, W. J. 63-K
Jackwirth, Günther 177-F
Jacobs, Alfred 89-B
Jacobs, J. E. 293-S
Jacobs, J. H. 2-C
Jacobs, Whipple 252-A
Jacobson, Edmund 727-K
Jacobson, H. J. 729-K
Jacobson, Murray 26-H
Jacquesson, Raymond 45-M, 139-Q
Jacquet, Pierre A. . . . 221-M, 455-M, . . 478-M, 480-M, 26-R, 389-R, 390-R
Jaeger, H. E. 349-T
Jaffé, George 124-P
Jaffe, Leonard D. . . 876-Q, 877-Q, 83-V
Jaffee, R. I. . . . . 156-C, . . 447-G, 166-L, 9-M, 62-M, 90-P, . . 883-Q, 533-T, 549-T, 166-V, 203-V
Jaggar, T. A. 955-Q
Jahnle, Herbert A. 194-V
Jameson, A. S. . . 28-Q, 974-Q, 546-T
Jan, J. P. 453-P
Jancovici, Bernard 526-P
Janiche, Walter 391-R
Janiec, J. 48-S
Jansen, H. 633-K
Jaoul, Bernard . . 333-Q, 660-Q, 1035-Q
Jardine, Frank 70-K
Jarlan, Henri 17-J
Jarrett, A. H. 545-P
Jasson, Philippe 266-E, 428-E
Jastrzebska, J. 385-Q
Jaswon, M. A. 329-Q
Jatczak, C. F. 238-J
Jaudon, E. 163-S
Javitz, Alex E. 357-T
Jeal, E. F. 312-A, 342-B
Jefferson, T. B. . . . . 95-K, . . 129-K, 223-K, 651-K, 769-K, 837-L
Jeffes, J. H. E. 431-P
Jeffrey, R. L. 14-L
Jeffries, C. D. 144-P
Jegaden, G. 19-M
Jehu, Llewellyn 800-K
Jellinghaus, Werner . . 189-P, 180-S
Jenicek, L. 273-M, 159-S
Jenkins, A. E. 280-M, 285-M
Jenkins, C. H. M. 898-Q
Jenkins, D. R. 73-J
Jenkins, G. C. H. 53-D, 201-D
Jenkins, I. 72-H
Jenkins, J. N. 88-B
Jenkins, S. 219-K
Jenkins, William D. 51-Q, 631-Q, 756-Q, 1016-Q

Jenkins, W. P. 43-L
Jenkinson, E. A. 361-Q
Jenks, F. 117-F
Jenni, Clyde B. 557-E
Jennings, C. W. 780-L
Jennings, James L. 127-D
Jennings, R. F. 321-D
Jensen, C. W. 127-C
Jensen, Howard M. 599-K
Jensen, James W. 911-Q
Jensen, R. S. 138-S
Jensen, Tyleen 174-L
Jensen, W. L. 607-Q
Jeppesen, N. A. 277-E
Jepson, M. D. 3-N, 71-N
Jermy, K. E. 366-D
Jerome, H. 14-L
Jesson, W. F. 369-L
Jessup, A. C. 251-R
Jewell, J. G. 126-R
Jirsa, Franz 395-R
Johannesen, J. K. 738-K
Johansen, H. A. 153-C
Johansson, Folke 85-D, 151-D
Johnen, H. 205-M
Johns, W. D., Jr. 74-E
Johnson, A. E. . . . 172-Q, 364-Q, 1053-Q
Johnson, Aldie E., Jr. 121-Q
Johnson, B. G. 16-Q, 31-Q
Johnson, Charles B. . . . 36-S, 50-S
Johnson, Charles Morris . . . 80-S
Johnson, C. S. 401-E
Johnson, Herrick L. 568-P
Johnson, Howard A. 424-Q
Johnson, I. W. 618-K
Johnson, J. B. 906-Q
Johnson, J. F. 15-B
Johnson, J. Fred 81-T
Johnson, J. P. 119-F
Johnson, Lee H. 268-A
Johnson, R. L. . . 396-Q, 639-Q, 843-Q
Johnson, S. J. 357-P
Johnson, S. L. 286-L
Johnson, V. A. 551-P
Johnson, W. E. 548-P
Johnson, W. H. 522-E
Johnson, W. R. 9-P, 113-Q
Johnston, Bruce G. 420-Q
Johnston, H. L. 209-P, 53-S, 106-S
Johnston, Samuel S. . . . 517-L, 568-L
Johnston, T. B. 153-S
Johnstone, S. T. M. 1-M
Jolibois, Pierre 75-C
Joliffe, K. H. 744-Q
Joly, Gabriel 267-E
Jominy, W. E. 874-Q
Jonassen, Finn 330-S
Jones, A. A. 551-Q
Jones, Archer B. 336-G
Jones, A. W. 347-R
Jones, D. J. 138-V
Jones, E. H. . . . 34-A, 77-A, 201-A
Jones, E. R. W. 220-R
Jones, E. W. 136-D
Jones, Garnet E. 102-F
Jones, G. L. 124-E
Jones, H. 327-Q, 700-Q
Jones, J. Raymond 619-E
Jones, M. H. 673-Q
Jones, P. G. 1069-Q
Jones, Ralph 248-L
Jones, S. C. 160-G
Jones, T. D. 74-V
Jones, W. D. 89-H
Jones, W. M. 305-P
Jones, J. Raymond 532-E
Jong, W. F. de 370-M
Jonker, J. L. H. 83-F
Jönsson, S. E. 256-K
Joralemon, Ira B. 104-A
Jordan, Charles B. 246-M
Jordan, J. P. 424-P
Jory, E. J. 76-E
Josefsson, Ake 200-Q
Joseph, James . . 137-G, 347-G, 696-K
Joseph, T. L. 77-B, 162-B
Josien, Francois-André 128-C
Josso, Emilie 323-N
Jost, W. 163-N
Joumat, P. 168-K
Jubb, W. 112-T
Juchniewicz, B. 383-D
Judkins, Malcolm F. 201-G, 221-G, 290-G, 363-G
Judson, C. M. 178-B
Julian, K. A. R. 441-E
Juliard, A. 317-P
Jungbluth, H. . . 46-E, 229-E, 450-E
Juniere, P. 158-T
Junker, H. J. 491-P
Jupe, John H. 192-S
Jupnik, Helen 27-M
Juppenlatz, J. W. 893-Q
Justi, E. . . 31-P, 286-P, 577-P, 589-P
Jutte, K. 325-B
Juvan, Hugo 527-S

K

Kaanta, H. W. 329-B
Kabacy, G. E. 424-G, 453-L
Kabanov, N. S. 432-K
Kadaner, L. I. 499-L
Kadmer, E. 501-G
Kafig, E. 285-L
Kagan, I. Z. 120-K, 380-K, 404-K, 434-K

Kaganov, N. L. 116-K
Kahan, George J. 169-L
Kahan, S. 185-S
Kaharl, Dudley J. 772-L
Kahl, W. H. 338-D
Kahler, H. Lewis 407-R
Kahn, N. A. 128-E, 390-E, 833-Q
Kaindl, K. 32-S
Kaiser, R. 482-Q
Kalinkin, B. I. 374-K
Kalish, Herbert S. 68-H
Kalish, T. V. 201-P
Kalischer, Philip R. . 16-H, 62-H, 73-H
Kallauner, O. 47-D
Kalling, Bo. 23-D, 85-D, 151-D
Kalpers, H. 176-J, 151-L, 194-L, 157-T, 485-T
Kamada, Akira 343-S
Kamada, Kaoru 369-Q
Kamen, E. L. 128-M, 193-M
Kaminetsky, J. 131-R
Kammerhofer, Othmar 284-F
Kan, L. S. 198-P
Kanda, Rikuro 21-E
Kane, J. G. 121-A
Kaneko, Renzo 96-G, 97-G
Kanie, Masahiro 21-E
Kantzer, Denise Laforgue . . . 233-R
Kaplan, L. A. 430-K
Kapustian, E. K. 258-P
Kapustin, A. P. 361-R
Karnisky, B. 162-K, 526-R
Karpenko, G. V. 85-R
Karpick, Ed. 122-H
Karsten, P. 230-S
Kasberg, A. S., Jr. 146-N
Kashima, Jiro 19-E, 547-E
Kashirin, A. I. 247-G
Kaspras, B. 528-S
Kastner, J. 481-S
Kato, Masao 930-Q
Katori, Kazuo 246-E
Katz, L. 275-P
Kauffman, David 24-G
Kaufman, Alvin B. 318-S
Kaufman, D. W. 1050-Q, 161-V
Kaufman, M. 107-K, 419-K, 610-K
Kaufmann, D. W. 7-K, 281-K
Kauhausen, E. 260-K, 661-K
Kauzmann, W. 797-Q
Kawaguchi, Toranosuke 978-Q
Kawakami, Masuo 260-J
Kawasaki, Masayuki . . . 343-M, 211-Q
Kawashima, Namio 287-N
Kay, C. M. 126-D
Kayama, Nobutaro . 20-E, 544-E, 446-R
Kayser, F. X. 237-J, 270-M
Kazakova, V. A. . 146-R, 147-R, 248-R
Kazimirov, Iu. M. 136-P, 161-P
Ke, T. S. 321-Q
Kearfott, A. J. 387-K
Kearns, W. H. 799-K
Keck, Paul H. 248-P
Kee, W. W. 183-P
Keefe, E. J. 388-K
Keefe, John H., Jr. 192-T
Keefer, C. E. 513-R
Keel, C. G. 579-K
Keeler, J. H. 304-L
Keeleric, George 182-G, 518-G
Keene, Walter L. 378-L
Kegel, K. 178-J
Keiffer, R. 35-H
Keil, Albert 788-Q, 394-R
Keith, W. P. 184-T
Kelfer, H. 14-L
Kellar, J. N. 552-Q
Keller, A. 700-L, 379-S, 515-S
Keller, F. 452-L
Keller, F. R. 84-A, 127-A
Keller, J. D. 1-B
Keller, R. H. 150-L
Keller, Walter 395-D
Kelley, Cornelius F. 106-T
Kelley, S. G., Jr. 1017-Q, 443-T
Kellner, M. J. 609-E
Kelly, J. C. R. 328-E
Kelly, J. H. 307-D, 328-D
Kelly, Warner M. 442-R
Kember, N. F. 21-S
Kemmer, F. N. 531-R
Kemp, C. Ridgely 448-G
Kemp, N. 412-S
Kemp, Robert E. 664-K
Kenmore, Herbert 297-T
Kennedy, A. J. 847-Q, 888-Q
Kennedy, C. W. 278-S, 365-S, 454-S
Kennedy, Harry E. 749-K
Kennedy, J. D. 147-V
Kennedy, J. S. 178-B
Kennedy, Richard E. 83-V
Kennedy, T. 753-L
Kennemer, Robert E. 488-Q
Kenney, N. T. 198-Q
Kenny, G. S. 519-P
Kent, L. G. 201-K
Kentzler, H. 354-T
Kenworthy, H. 158-C
Keraval, Jean 263-T
Kerby, Eric A. 326-T
Kerlin, W. W. 486-E
Kern, L. B. 263-L
Kerr, Eugene C. 568-P
Kerr, James G. 752-K
Kerridge, M. 584-Q

Kershaw, D. T. 239-S
Kershner, K. K. 20-B
Kerstan, W. 741-L
Kersten, Martin 71-P
Kessler, H. D. . . 236-M, 268-M, 384-M
Kessler, S. W. 18-N
Ketchen, Eugene E. 43-P
Ketchledge, R. W. 152-K
Ketterl, H. 996-L
Ketzlach, Norman 32-C
Keyser, Carl A. 229-A
Keyte, Jack B. 100-K
Keywell, Frank 242-N
Khairy, E. M. 477-P
Kheifets, V. L. 70-C
Kheinman, A. S. 498-L
Kheynman, A. S. 186-L
Khotkevich, V. I. 199-P
Khrenoff, K. K. 714-K
Khrenov, K. K. . . 265-K, 368-K, 477-K
Khromova, Ts. S. 376-K
Kiado, Akademiai 226-F
Kiddle, P. F. 932-Q
Kiefer, E. W. 189-S
Kieffer, R. 950-L,
133-M, 254-M, 458-M, 118-V, 134-V
Kienzle, Otto 309-G
Kiernan, J. F. 228-G
Kies, J. A. 253-Q
Kiessling, R. 442-M
Kieswetter, Jan 48-E
Kikuchi, Yoshimitsu 56-P
Kilburn, C. V. 96-E
Killeffer, D. H. 528-P
Killing, Erich 348-D
Kimble, George H. T. 51-B
Kimmel, R. M. 483-S
Kimmel, Robert T. 75-G
Kimura, Katsuyoshi 369-Q
Kimura, Yasuyuki 919-L, 981-L
Kincaid, Homer 123-L, 185-L
Kinelski, E. 526-R
King, A. 332-B, 184-N
King, A. J. 534-T, 550-T
King, A. R. 882-L
King, Cecil V. 349-R, 508-R
King, Charles F. 225-T
King, F. E. 916-L
King, Lewis W. 311-F
King, R. M. 370-L
King, Ronald 413-Q, 735-Q
King, Rowland 242-A
King, William 683-L
Kingery, W. D. 492-P
Kingman, F. E. T. 326-A
Kingsbury, G. W. 359-S
Kinkelnburg, Wolfgang 88-K
Kinney, Joseph, Jr. 91-V
Kinnunen, Jorma 222-S
Kinzel, A. B. . . . 122-G, 192-M, 83-V
Kipp, Ralph H. 787-K
Kir'iakov, G. Z. 310-T
Kirillov, N. I. 186-L, 498-L
Kirkby, H. W. . . . . .
. . . . . 1008-Q, 1014-Q, 80-T, 124-T
Kirshenbaum, A. D. 449-S
Kissel, W. 1011-Q
Kissling, Conrad von 95-F
Kitchener, J. A. 80-P, 465-P
Kittel, C. 243-M
Kittel, J. Howard 92-P
Kivnick, Arnold 133-C
Klare, Paul 160-C
Klassen, V. I. 115-B
Kleeman, F. S. 631-E
Klein, H. 261-K
Klein, L. A. 179-J
Kleinberg, Jacob 206-L, 207-L
Klemantaski, S. 319-D
Klemens, P. G. 21-P, 95-P
Klemm, W. 100-M, 491-P
Klemming, S. G. 483-T
Kleppinger, D. H. 415-E
Kley, Rudolf 222-B
Kline, B. F. 75-E
Klingeman, W. E. 99-K
Kliushin, V. V. 135-M
Kloda, R. 33-S
Klopfert, Adolph 393-K, 460-K
Klose, Helmut 379-M
Klosse, Ernst 227-K
Kluber, H. V. 545-P
Klushin, M. I. 244-G
Klyachko, Yu. A. 190-E
Knackstedt, Walter 219-F
Knapp, Alfred P. 544-T
Knapp, Helmut 236-N
Knapp, W. E. 190-B
Knapp, Wilhelm 183-F
Knappwost, Adolf 57-P
Knauft, R. W. 96-E
Knerr, Horace C. 225-J
Knight, D. F. 572-E
Knight, W. D. 243-M
Knight, Webster B. 381-L, 505-L, 510-L
Knipp, E. 210-E
Knoerr, Alvin W. 95-A, 118-B
Knorr, Walter 192-P
Knowlton, H. B. 109-J, 382-Q,
. . . 59-V, 103-V, 104-V, 135-V, 194-V
Knudsen, K. E. 16-Q
Knuth-Winterfeldt, E. 382-L
Knüpple, Helmut 186-D
Kobayashi, Takeo 98-P
Kobiakov, P. V. 180-F
Koch, A. H. 267-J

Koch, H. 661-K
Koch, K. M. . . 38-P, 67-P, 150-P, 579-P
Koch, L. 504-E, 953-L
Koch, P. 128-L, 300-S
Koch, Walter 178-D, 202-M, 1040-Q, 484-S
Kochendorfer, Albert 292-M, 565-Q, 717-Q, 1046-Q
Kocher, H. 753-K
Kochergin, K. A. 540-K
Kochnev, M. E. 108-P
Kochnev, M. I. 530-R
Kock, J. J. 957-Q
Kodis, R. D. 234-S
Koehler, J. S. 288-Q, 313-Q, 320-Q, 450-Q, 780-Q
Koehler, W. C. 50-P
Koelzer, Herbert 538-S
Koenig, R. F. 185-R
Koenigsberger, F. . 505-K, 529-K, 760-K
Koh, P. K. 278-M, 255-S
Kohl, Walter H. 389-T
Kohler, M. 31-P
Kohlhase, Friedrich 175-F
Kohlmeyer, E. J. 138-C
Kohn, A. 162-D, 555-Q
Kohn, André 88-N
Kohn, J. A. 33-G, 435-Q
Kolb, John 108-J, 39-L
Kolb, Wolfgang 442-S
Kolkmeyer, A. H. 446-M
Kolodin, M. V. 260-P
Komers, Max 58-K
Komlosy, G. F. 92-S
Kompfner, R. 201-T
Kondic, V. 36-E, 107-E, 282-E, 425-E, 479-E, 189-N, 560-P
Kondo, Yoshio 359-B
Kondorskii, E. 156-P, 257-P
König, Arnost 43-C
König, Hans 366-L
Konobeevskii, S. T. 156-M
Kooistra, L. F. 332-Q, 776-Q
Kopelman, B. . . . 71-H, 263-P, 459-P
Koppe, H. 149-P, 284-P
Korbelak, A. 785-K
Korenev, N. I. 296-M
Koreneva, E. I. 296-M
Kornev, Iu. V. 100-N
Kornfeld, Heinz 1060-Q, 348-S
Kornilov, I. I. . . . 53-M, 136-M, 138-M
Korolev, A. Ia. 782-K
Korovskii, Sh. Ia. 144-Q
Korringa, J. 4-P
Kortüm, G. 119-P
Koshiba, Sadao 255-J
Koshuba, W. J. . . . 50-H, 35-Q, 399-T
Koster, G. F. 219-M
Koster, Werner 130-A, 41-H, 70-H, 88-H, 71-M, 457-M, 234-N, 235-N, 310-N, 312-N, 105-Q, 123-Q, 349-Q, 328-R
Kostock, F. Robert 30-V
Kostron, Hans 324-F, 304-N, 311-N, 103-Q, 1087-Q, 182-S
Kotlarczyk, Karol 21-C
Kotov, A. G. 420-P
Kotrovskii, M. M. 180-F
Kottmann, A. 252-N, 522-S
Kouvelities, J. S. . 51-P, 403-P, 561-P
Kouwenhoven, W. B. 55-P, 139-P, 570-P
Kovalenko, P. N. 497-L
Kovel, Ralph M. 380-A
Kozachkov, E. A. 161-N
Kozlovskii, M. T. 397-L, 398-L
Kraatz, F. C. 579-L
Krabacher, E. J. 53-G, 105-G, 452-G, 453-G
Kraft, R. W. 78-E
Krailing, W. J. 55-F, 141-J
Krainer, H. 40-J, 513-Q
Kralik, Ferd. 459-Q
Kramer, H. M. 111-D
Kramer, I. R. 203-Q
Kramer, Kurt 580-E
Kramer, O. 356-L
Kramer, T. E. 524-E
Kraner, H. M. 206-D
Kranz, Josef 467-M
Krasmar, Eduard 202-F
Krasovskii, A. I. 383-K
Kraupner, K. W. 787-Q
Kraus, Gerard 235-K, 586-K
Kraus, Jan 292-D
Kraus, R. 43-S
Kraus, Th. 24-H
Krause, A. 93-J
Krause, D. E. 61-E
Krauskopf, Konrad B. 41-P
Krauskopf, Walter 233-A
Kraut, Ralph J. 178-G
Krautkrämer, H. 245-S
Krautkrämer, J. 245-S, 283-S
Krautmacher, Hanns 273-J
Kredel, Horst 290-D
Krehl, Kurt 456-P
Kreiner, Joseph M. 314-E
Kreitz, Karl 482-T
Krekeler, Karl 323-G, 781-K
Kremmer, John 228-J
Krider, H. S. 333-P
Kriessman, C. J., Jr. . . 115-P, 143-P
Krifka, Otto 165-D
Krijgsman, C. 83-B
Krill, F. M. 471-M
Kripiakevich, I. I. 105-M

Kripiakevich, P. I. 410-M
Kripiakevich, P. P. 178-M
Krisch, Alfred 102-Q, 304-Q
Krisement, Otto 217-N, 716-Q
Krishnan, M. S. 200-B
Kritscher, A. F. 109-F
Kriukovskii, N. N. 113-K
Krivobok, V. N. 605-Q, 907-Q
Kriz, M. A. 95-A
Kroger, Carl 148-C
Kroha, A. J. 287-A
Kroll, W. J. 45-C, 60-C, 89-C, 11-V
Kroneis, Max 40-J
Kronenberg, Max 464-G
Kronsbein, John 221-L
Kronstein, Max 339-R
Kropschot, R. H. 197-J
Krosch, D. K. 702-L
Kortkov, D. V. 532-S
Krouse, Harvey 313-D
Kruer, Harold H. 99-K
Krug, Willi 410-P
Krüger, G. 364-L
Kruikova, O. N. 297-M
Krupkowski, A. 62-C
Krusenstjern, Arvid von 744-L
Krynitsky, A. I. 64-E, 199-E, 256-E, 289-E, 476-E
Kubaschewski, Oswald . . 744-L, 197-S
Küchli, G. 167-J
Kuczynski, G. C. 324-N
Kudelia, E. S. 267-K, 357-S
Kudriatsev, I. V. 142-Q, 355-Q
Kuhlmann- Wilsdorf, D. 288-M
Kuhn, H. 449-P
Kuhn, K. 545-P
Kuhn, Martin 321-F
Kuhn, Paul 1071-Q
Kuhn, R. 1037-Q
Kuhn, W. E. 57-C, 58-C
Kuhne, Hans- Joachim 183-F
Kuhnel, Reinhold 808-K
Kuhnelt, Wolfgang 950-Q
Kukaczka, R. 237-L
Kula, Eric 200-Q
Kulcke, W. 420-M
Kulesz, J. J. 78-D
Kulin, S. A. 74-N, 183-N
Kumanin, I. B. 519-E
Kummer, T. H. 219-E
Kunc, J. F., Jr. 972-Q
Kunde, Marvin A. 230-B
Kunin, L. L. 190-E, 60-P
Kunkle, B. B. 125-C
Kuntze, Wilhelm 339-Q
Kunz, F. W. 798-Q
Kunz, H. 356-G
Kunze, C. T. 133-L, 823-L
Kunze, Ernst 177-J
Kuo, Kehsin . 212-J, 361-M, 417-M, 68-N
Kuperschmid, Norman 539-L
Kura, J. G. 308-E, 311-E, 644-E
Kurdiumov, G. V. 62-N, 100-N, 105-N, 275-N
Kurenev, V. Ia. 511-P
Kuris, A. 65-G
Kuritsyna, E. F. 105-P, 512-P
Kurnakov, N. N. 422-P
Kurochkin, K. T. 457-P
Kurzinski, E. F. 88-D
Kusakawa, Takaji 21-E, 366-M
Kushner, Joseph B. . 26-L, 146-L, 855-L
Kushnerev, D. M. 265-K
Kuske, A. 927-Q, 983-Q
Küsters, K. 293-G
Kuti, A. J. 785-I
Kutovyi, I. V. 176-M
Kuzin, A. I. 493-K
Kuziushin, V. V. 94-G
Kuzmak, E. M. 112-K
Kuzmak, J. M. 187-M
Kuzmick, Jerome F. . . . 86-H, 92-H
Kuznetsov, V. G. 122-M
Kwolek, John 417-G
Kwong, J. N. S. 15-B

L

LaBee, Alfred F. 266-L
la Blanchetais, Charlotte Henry 297-P
Labonek, F. 273-M
LaChance, M. H. 883-Q
Lachenman, J. 257-L
LaCombe, Paul 43-M, 111-N
Lacomble, L. 411-S
Lackenby, H. 913-Q
Lacquer, Henry L. 374-P
Lacy, C. C. 96-R
Lacy, William J. 514-T
Lafon, J. E. 248-B, 331-B, 163-D, 175-D, 301-D, 330-T
Lafont, J. 96-F, 192-F
Laforgue-Kantzer, Denise . . . 233-R
LaForsch, Eugen 290-D
Lagarrigue, Andre 341-P
Lagergren, Stig 244-M
Lahodny, A. 20-M
Lake, Rex L. 17-Q
Laken, Thomas H. 220-L
Lamb, Vernon A. 187-L
Lambert, C. S. 269-L
Lambot, Honoré 317-M
LaMer, Victor K. 165-N
Lamourdedieu, Marcel 83-J
Lancaster, J. K. 584-Q
Lance, A. E. 55-B

Lancy, Leslie E. 126-A
Land, E. A. 89-E
Land, T. 22-S, 23-S
Landau, Ralph 420-R
Landauer, Rolf 460-P
Lander, J. J. 533-R
Landerl, H. 160-Q
Landgraf, F. K. 44-M
Landolt, P. E. 19-T
Landfermann, C. A. 98-F
Lane, D. 461-E
Lane, I. Roy, Jr. 423-R
Lane, Joseph R. 867-Q
Lane, P. H. R. 839-Q
Lang, C. 75-B, 141-D
Lang, Frances S. 349-R
Lange, E. A. . . . 299-E, 583-E, 425-Q
Lange, Hansheinz 155-N
Lange, K. 573-K
Lange, Werner 215-D
Langen, M. 313-F
Langenheim, A. H. 52-F
Langers, Robert 921-Q
Langford, K. E. . . 41-L, 335-L, 419-L
Langsdorf, Alexander, Jr. . . . 268-P
Langton, J. W. 222-G
Langum, Bjorn 274-E
Langhammer, A. J. 23-H
Lankes, Johann Christian . . . 69-M
Lanphier, Basil T. 384-T
Lanzendörfer, E. 209-E, 636-E
Lapatukhim, V. S. 158-L
Lapidus, V. A. 118-K
LaPota, J. B. 452-E
Lappin, Frank S. 407-L
LaQue, F. L. . . . 403-L, 95-R, 184-R, . . 202-R, 256-R, 320-R, 418-R, 294-T
Lardge, H. E. 24-K
Lardner, E. 366-Q
Lareau, Joseph H. 488-G
Larigaldie, A. 459-K
Larke, Eustace C. 276-Q
Larke, L. W. 306-N
Larkin, James E. 111-A
Larsen, B. M. 17-D
Larsen, E. I. 83-V
Larson, C. M. 468-G
Larson, F. R. 774-Q
Larson, H. E. 229-F
Larsson, Ake V. 10-C, 428-Q
Laschinger, J. E. 174-E
Lashko, N. F. . . . . 231-K, . 399-K, 469-K, 484-K, 137-M, 139-M
Last, George A. 216-B
Latham, Charles W. 274-T
Latham, R. 273-P
Lathrop, A. L. 404-P
Latimer, J. 678-K
Latimer, Wendell M. 529-P
Latin, A. 371-Q, 28-T
Latta, J. D. 74-F
Latter, Clyde H. 506-S
Lattey, Richard 493-L
Latzin, Kurt 771-K
Laue, K. 179-F
Launders, H. L. 889-L
Laurance, E. N. 393-G
Laurant, P. 98-N
Laurent, Pierre . . . . 17-J, 110-N, . . 303-N, 215-Q, 781-Q, 855-Q, 1094-Q
Lauterbach, William E. 298-G
Lauterjung, Gustav 227-E
Lautz, G. . 31-P, 286-P, 577-P, 589-P
Laval, Gaston 306-G
LaVelle, Donald A. 298-E
Lavender, J. D. 111-M
Law, R. R. 569-T
Lawrence, J. B. 168-P
Lawrence, John H. 305-L
Lawrie, W. B. 340-E
Lawson, C. F. 568-E
Lawson, W. D. 52-N
Lawton, George C. 95-D
Laxen, P. A. 278-B
Laycock, George 346-T
Layland, E. L. 547-K
Layton, D. N. 186-M
Lazan, B. J. 596-Q, 687-Q
Lazarev, B. G. 155-P, 198-P
Lazarev, B. I. 431-K
Lazarus, D. 290-N
Lazendorfer, E. 416-E
Leach, A. E. 161-V
Leach, Max 238-A
Leadbeater, C. J. . . . 43-H, 45-H, . . . 47-H, 49-H, 473-L, 203-P, 356-Q
Leaf, Walter 769-Q
Leake, James A. 17-G
Learmonth, G. S. 83-K
Leathers, E. H. 97-D
Leavens, Dickson H. 95-A
Leavenworth, Max 199-L
Leavitt, W. Z. 76-M
Lebbink, F. J. 377-M
Lebed, D. P. 275-K
Lebedeva, T. V. 407-Q
LeBrocq, L. F. . . . . .

Lee, H. 12-Q
Lee, H. T. 194-Q
Lee, James K. 994-L
Leech, H. R. 946-L
Leeds, Earl P. 113-G
Leeds, R. E. 271-F
Leeks, R. 160-E
Leemann, A. 167-J, 168-J
Leemans, A. 201-T
Lees, D. C. G. 337-E
LeFebvre, F. J. 127-R
Legat, A. 790-Q
Legendre, Andre 198-B
Legoux, M. P. 224-B
Legrand, Ch. 94-M
LeGrand, Ruper 288-F
Lehnert, Bo. 557-P
Lehrman, Leo 406-R
Leib, F. E. 555-P
Leibfried, G. 465-Q, 1067-Q
Leibson, J. S. 313-T
Leidheiser, H., Jr. 575-Q
Leigh, E. T. . . . 225-D, 252-D, 372-D
Leihy, C. W. 99-T
Leiris, H. de . . . 254-Q, 917-Q, 161-S
Leise, K. H. 954-L
Leith, C. E., Jr. 269-P
Leitner, Franz 274-D
LeLionnais, F. 184-P
Lelong, P. 649-L, 139-Q
Lement, B. S. 193-M
Lemmlein, G. G. 409-M
Lemoine, J. A. 216-N
Lemon, D. J. 7-A
Le Monnier, J. 156-T
Lena, A. J. 192-Q
Lenhart, Walter B. 18-B
Lentz, C. D. 452-K
Lenz, Dieter 355-G
Leonard, J. 175-E
Leonard, R. D. 302-K
Leonardos, Othon H. 207-B
Leone, O. Q. 2-C
Leontis, T. E. 263-Q, 535-Q
Lepito, Thomas J. 665-K
Lequear, H. A. 677-Q
Lerebours-Pigeonniere, J. . . 151-F
Lerew, A. A. 178-B
Lerinman, R. M. 48-M
Le Rolland, Paul 783-Q
Le Roux, R. 209-N, 226-N
Leroy, P. . .150-D, 239-D, 247-D, 385-D
Lescoeur, Jean 34-T
Lescop, Pierre 137-Q
Lesher, C. E. 161-B
Leskov, G. I. 379-K
Leskovich, I. A. 52-H
Leslie, H. L. C. 17-K
Leslie, W. C. 86-M
Lesser, D. O. 397-T
Lethan, R. 381-E
Le Thomas, Auguste . . 78-L, 301-L
Le Thomas, Pierre-Julien . . 213-Q
Letort, V. 85-B
Levan, R. K. 602-Q
Levchenko, E. A. 558-K
Lever, F. M. 72-A, 73-B
Levi, W. W. 159-E, 306-E
Levin, A. I. . . . 176-R, 177-R, 304-R
Levin, I. A. 304-R
Levine, N. M. 177-B, 334-E
Levit, G. A. 312-G
Levoe, Clarence E. 497-E
Levy, Alan V. 749-K
Levy, B. 161-E
Levy, Henri A. 481-P
Levy, S. 270-P
Lewis, A. G. L. 295-B
Lewis, A. J. 639-L
Lewis, C. J. 85-A
Lewis, C. R. . . . 647-Q, 344-S, 437-S
Lewis, D. M. 216-S
Lewis, F. G. 666-Q
Lewis, Floyd A. 259-J, 116-T
Lewis, G. B. 75-L
Lewis, John R. 165-C, 58-M
Lewis, Kenneth B. 255-F, 42-G
Leyensetter, Walter . . 505-G, 508-G
Lewis, W. R. 66-K
Lewsey, Bernard C. . . 42-L, 796-L
Ley, F. D. 276-E
Leys, J. A. 225-D, 252-D, 255-D, 372-D
Leytze, G. A. 263-J
Liakhov, G. M. 392-P
Liakhovetshaia, E. I. 510-P
Liass, A. M. 519-E
Libbey, F. W. 368-B
Libove, Charles 757-Q
Libsch, J. F. 67-H, 149-J
Liddiard, E. A. G. 267-Q
Liddiard, P. D. 395-E
Lidiard, A. B. 598-P
Lidman, W. G. 114-H, 707-Q
Liebold, R. 321-B
Lieby, G. 482-E
Liesegang, Marie Buckeley . . 354-E
Lietzke, M. H. 593-L
Lifshits, E. M. 152-P
Light, R. J. 26-J
Ligsnii, Iu. D. 251-S
Lihl, Franz . . . 127-H, 257-M, 466-M
Liljeberg, J. W. 13-P, 140-P
Lilliendahl, W. C. 137-N
Lillieqvist, G. A. . 537-E, 612-E, 987-Q
Limbach, Lawrence M. 607-K
Linacre, E. T. 54-D, 126-Q

Linde, J. O. 536-P
Lindgren, R. P. 98-K
Lindner, Erich 153-M
Lindqvist, Hans 914-Q
Lindroos, Emert W. 279-B
Lindskog, Lennart 85-D, 151-D
Linford, Henry B. 55-L, 116-L
Linforth, Arthur 108-A
Linforth, F. A. 349-A
Lingenberg, W. 491-P
Linhart, Otto C. 400-L
Link, H. S. 265-M
Linnenbank, C. D. 126-F
Linnert, G. E. 97-K, 562-K
Linsley, H. E. 125-G, 1-S
Linz, Arthur 528-P
Lipin, S. V. 290-P
Lipkowitz, Irving 125-A
Lips, E. M. H. 129-A, 459-G
Lipsett, Charles H. 18-A
Lipson, H. 145-M, 224-M, 438-M
Lipson, S. 304-E
Lismer, R. E. . . 195-D, 112-M, 179-N
Lissner, Otto 358-R, 480-R
Litchfield, Lawrence, Jr. . . . 106-A
Litell, Joerg 515-K
Litterscheidt, Walter 43-B
Little, Clarence W. 570-P
Little, G. P. 209-V
Littler, D. J. 533-P
Littmann, M. F. 494-P
Litton, Felix B. 5-C, 116-Q
Liu, T. S. 386-M, 272-Q
Liubavskii, K. V. 266-K, 431-K
Liubov, B. Ia. . . 33-N, 238-N, 279-N
Livingood, M. D. 139-A
Livingston, Ralph 145-P
Livingstone, D. A. 58-B
Lizaur, Ricardo Guevara 84-B
Ljunggren, Stig H. 598-E
Lloyd, W. H. 196-R
Locati, Luigi 491-Q, 547-R
Lockett, E. E. 533-P
Lockington, N. A. 62-L, 109-L, 219-L, 283-L
Lodge, J. W. 1074-Q
Loebich, O. 151-K
Loeliger, H. 144-P
Loeschmann, Arnold 237-F
Loewer, A. C. 46-R
Loewy, Erwin 130-F
Loferski, J. J. 522-P
Löfgren, Börje 10-C
Logan, Hugh 250-R, 331-R
Logan, Zack 253-L
Lohausen, Karl A. 959-L
Löhberg, K. 155-L, 154-N, 859-Q, 938-Q
Lohman, C. 292-P
Lohmann, T. 381-M
Lohse, Fred 39-B
Loiseleur, Jean 320-L, 120-R
Lomas, J. . . . 92-G, 6-J, 48-J, 231-J, . . 70-N, 62-Q, 410-Q, 434-R, 52-T, . . 530-T, 146-V, 159-V, 164-V, 206-V
Lomer, W. M. 264-M, 198-S
London, H. 258-E
Long, E. A. 305-P
Long, Earl 252-P
Long, John V. . . 502-L, 704-L, 884-L
Long, L. M. 104-C
Long, Roger A. 194-V
Longard, K. 150-K, 71-T
Longden, E. 348-E
Longenecker, Charles 77-V
Longhurst, E. E. . . . . 462-L, . . 464-L, 717-L, 103-R, 289-R, 233-S
Lonskii, E. D. 473-K
Loorz, Walter 548-S
Lopadze, T. N. 245-G
Lopata, A. Ia. 311-G
Lopmann, G. 220-N
Lord, H. W. 326-P, 341-T
Lord, Samuel S., Jr. 386-S
Lorentz, R. E., Jr. 279-K
Loria, Edward A. . . . 1-D, 193-D, . . 153-G, 391-G, 499-G, 510-G, 32-M
Loriers, Jean 136-R
Lorig, C. H. 36-Q
Loring, B. M. 638-Q
Lorking, K. F. 423-L
Loshkarev, M. A. 157-L
Loude, René 30-S, 333-S
Loughrey, D. R. 106-D
Love, Forrest E. 165-R
Love, Frank H. 173-K, 597-L
Love, P. P. 580-Q
Love, R. J. 174-Q, 433-Q
Love, W. F. 520-P
Low, J. R., Jr. 505-Q
Lowe, J. H. 526-E
Lowell, W. O. 62-D
Lowenheim, Frederick A. 647-L, 827-L, 861-L
Lowrie, Robert 991-Q
Lowthian, C. S. 246-Q
Loxham, J. 377-S
Lozinskii, M. G. 132-N, 726-Q
Lubahn, J. D. 669-Q, 677-Q
Lubker, Robert A. 25-V
Lubker, R. R. 4-E
Lucas, Karl-Heinz 264-F
Lucas, L. N. D. 5-R
Luce, Walter A. 15-R, 189-V
Luchkin, G. P. 360-R
Lucht, F. W. 193-G, 198-G, 216-G, 286-G
Lucic, A. 112-P

Lücke, Kurt 155-N, 190-N
Ludwig, Carl 207-D
Ludwig, Davidlee Von 17-E, 18-E, 178-E
Ludwig, N. 19-J
Lueg, Werner 23-F, 107-F, 140-F
. . 155-F, 216-F, 320-F, 715-Q, 54-S
Luft, G. 446-S
Luibov, B. Ia. 223-N
Luiten, C. H. 213-J, 135-R
Luke, C. L. 339-S, 384-S, 385-S
Lukovskaia, N. V. 207-N
Lüling, H. 132-M
Lumsden, John 300-P
Lund, H. 436-P
Lundbye, Axel 486-L
Lundholm, Joe, Jr. 840-Q
Lundin, C. E. 387-M
Lunev, A. F. 189-R
Lutsch, Adolf 794-Q, 181-S
Luttrell, Gwendolyn Werth . . . 47-A
Luyet, B. 16-S
Lutz, Willy 272-J
Lyle, A. G. 16-A
Lynam, T. R. 91-D
Lynch, J. J. 750-Q
Lynn, W. W. 453-E
Lyon, Tom 103-A
Lysobey, W. R. 393-D
Lyst, J. O. 487-Q
Lytle, Charles W. 89-A

M

McAndrew, Joseph B. . . . 2-R, 107-R
McArthur, B. E. 113-F
McArthur, D. S. 972-Q
McBean, K. D. 111-C
McBee, F. W., Jr. 44-K, 780-K
McBrian, Ray 137-S
McBride, Clinton C. 281-L, 164-Q
McBride, D. L. 331-Q
McCabe, Louis C. 61-A
. . . . . 86-A, 200-A, 228-A, 236-A
McCaig, M. 228-P, 334-P
McCall, Begbie 104-E
McCamish, H. M. 443-R
McCann, S. W. 15-R
McCarran, Pat 109-A
McCarthy, J. J. 104-K
McClellan, R. L. 255-L
McClenahan, W. T. 223-L
McClintock, F. A. 628-Q, 967-Q
McClure, J. W. 14-P
McComb, John C. 371-A, 60-F, 127-F, 316-F
McConachie, James 427-E
McConnell, W. B. 178-L
McConomy, H. F. 271-R, 415-R
McConville, Thomas W. 583-K
McCormick, Frank J. 1093-Q
McCormick, T. F. 185-F
McCorman, O. N. 57-R,
. . . 73-R, 105-R, 380-R, 505-R, 538-R
McCormick, J. B. 30-K, 286-K
McCoy, F. B. 466-S
McCracken, J. 283-D, 284-D
McCrea, K. W. 341-L
McCurdy, R. J. 16-D, 131-S
McCurdy, W. H., Jr. 143-S
McCutcheon, K. C. 209-D
McDermid, Archie, J. 112-A
McDonald, J. C. 109-Q,
. . . . . 633-Q, 759-Q, 890-Q, 42-V
McDonough, W. G. 42-D, 71-D
McDowell, D. W., Jr. 109-E
McDowell, J. K. 173-S
McDowell, J. Spotts 1-B
McElgin, James 53-J
McElrath, T., Jr. 101-K, 172-K
McElroy, Albert D. 207-L
McElwee, R. F. 172-L, 857-L
McEntee, H. R. 124-H
McFaddin, D. E. 37-R
McFarlane, N. B. 92-D
McGarvey, F. X. 136-A
McGeary, D. J. 312-F
McGee, J. C. 4-Q
McGlashan, Donald W. 184-B
McGraw, E. Clyde 433-R
McGregor, N. B. 366-Q
McGrew, Brownell 319-B, 330-B, 348-B
McGuire, T. R. 115-P, 143-P
McGuire, W. J. 494-R
McHard, J. A. 15-R
McHargue, Carl J. 239-M, 704-Q
McIlveen, E. E. 472-T
McIlwaine, F. S. 14-L
McIntire, H. O. 113-M
McIntosh, R. O. 310-K
McIntyre, J. B. 488-E
McKeehan, L. W. 51-P, 403-P
McKenzie, I. B. 198-L
McKeown, J. 10-Q, 484-Q, 741-Q, 897-Q
McKisson, Raleigh L. 74-P
McKnight, Floyd 179-G
McLachlan, Dan., Jr. 184-N
McLauchlan, T. A. 448-M
McLaughlin, Russell 74-G
McLean, D. . . . 160-M, 23-N, 531-Q
McLean, H. T. 907-L
McLeer, T. J. 12-E
McLeod, H. 162-A
McLeod, J. M. 46-D
McMaster, Robert C. 10-S
McMaster, Werdley D. 112-L
McMillan, W. R. 503-R

McMillin, Gordon 127-D
McMullen, J. 77-J
McNabb, Wallace M. 350-R
McPherson, D. H. 317-K
McPherson, D. J. 385-M, 387-M
McPherson, Donald B. 705-L
McPherson, Dougal 61-L, 119-L
McQuaid, H. W. 63-D, 330-D, 331-D, 243-J
McQuillan, A. D. 119-N
McQuillan, Marion K. 1-M
McSweeney, E. E. 810-L
Ma, Chuk-Ching 25-H, 150-R
Maag, Max 299-S
Maase, Ernst 376-T
Maass-Graefe, Friedrich 153-L, 530-L
MacArthur, J. S. 41-C
MacConachie, James 91-E
MacDonald, D. K. C. 28-P, . . 45-P, 131-P, 178-P, 267-P, 602-P
MacDonald, J. R. 19-P
Macdonald, N. D. 141-D
MacDonald, P. M. 209-Q
Mace, E. W. 210-F, 275-F
Macfarlane, C. E. 384-R
MacGillavry, C. H. 446-M
MacGillavry, D. 55-R
MacGregor, C. W. 166-Q, 506-Q, 908-Q, 1072-Q
MacGregor, R. A. 336-D
Machemer, Paul E. 350-R
Macherauch, Eckard 1066-Q
Machlin, E. S. . . . 78-N, 139-N, 145-N
Machol, Morris R. 366-A
Machu, Willi 481-R
MacIntosh, Robert M. 775-K
Mack, David J. 146-N
Mackasek, Edward 390-L
Macke, H. J. 548-K
MacKenzie, B. J. 186-T
Mackenzie, I. M. 5-D, 129-Q
Mackenzie, J. 44-D, 144-D, 285-D, 286-D
Mackert, Anton 25-F
Mackintosh, H. H. 202-K
MacLellan, G. D. S. 306-F
MacMeekin, R. J. 540-R
MacNew, Thomas 83-G
MacPherson, E. S. 173-T
MacPherson, Frank H. 174-B
Maddin, Robert . . . . . 35-M, ... 203-Q, 261-Q, 887-Q, 1013-Q
Maddocks, W. R. 316-D
Madej, W. 32-B
Madsen, I. E. 59-A
Maeda, Seiziro 100-P
Maersch, Robert E. 804-K
Maetz, Helmut 303-D
Magliano, Giorgio 81-Q
Magnéli, Arne 144-M, 244-M
Magnan, Claude 67-M
Magoffin, L. E. 285-R
Mahl, Hans 150-M
Mahler, G. T. 93-C
Maillet 347-S
Mains, R. M. 7-Q
Mairs, K. H. 95-V
Maitak, G. P. 247-R
Majors, Harry, Jr. 18-Q, 653-Q
Majumdar, K. K. 340-B
Makarov, E. S. 163-M
Mäkelt, Heinrich 161-T
Makiguchi, Toshisada . . . 23-E, 548-E
Makolkin, I. A. 245-R
Maksimova, O.P. 62-N, 104-N, 105-N, 275-N
Malavard, L. 712-Q
Malcalm, E. D. 9-D
Malcolm, George N. 79-S
Male, D. 444-P
Malenock, P. R. . . 266-M, 622-Q, 870-Q
Malinkina, E. I. 249-G
Mallener, K. 581-E
Mallery, J. H. 79-N
Mallet, Bernard 332-T
Mallet, Gaston 73-Q
Mallet, M. W. 12-M, 31-M, 188-M
Malmgren, L. W. 85-V
Malmberg, T. 484-E
Maltz, J. 620-K
Malyshev, K. A. 82-N, 729-Q
Mandelcorn, L. 178-L
Manenc, Jack 45-M, 139-Q
Manes, C. E., Jr. 68-J
Maney, Charles A. 429-Q
Manintveld, J. A. 26-P
Manjoine, M. J. 674-Q
Manly, W. D. 127-M, 193-M
Mann, A. K. 593-P
Mannchen, W. 319-M, 345-Q
Mannin, J. 467-G, 496-G
Manning, G. K. . . . 162-M, 77-N, 1074-Q
Mano, Kunio 104-L
Manor, Frank 156-F
Mansa, J. L. 537-R
Mansell, Rick 830-L
Mansion, H. D. 1002-Q
Manson, S. S. 1020-Q
Mantell, C. L. 178-V
Mantell, J. C. 46-J
Manterfield, D. 25-S
Mantle, E. C. .142-E, 494-E, 533-E, 4-K
Mantovani, E. 997-L
Marais, P. 38-R
Maravec, Joseph G. 473-M
Marchand, G. 460-M
Marchese, Vincent J. 170-L

Marciel, Lybio Antunes. 290-T
Marcus, J. A. 14-P
Maréchal, J. 38-M
Marek, Richard 57-K
Margolis, M. 33-M
Marguerat, E. 644-Q
Marin, Joseph 106-Q,
. . . . . 545-Q, 588-Q, 685-Q, 875-Q
Marincek, Borut 228-E
Maringer, R. 195-Q
Maritano, O. 490-T
Markiefka, Gunter 1041-Q
Markl, A. R. C. 650-Q
Marks, E. 689-L
Marks, Henry C. 411-R
Markson, A. A. 401-S
Marotta, R. 14-L
Marpon, Roger 412-G, 949-L
Marquardt, C. M. 465-S
Marriner, R. S. 257-S
Marsden, Arthur 129-R
Marsh, C. 4-T, 46-T, 393-T
Marsh, E. C. J. 915-L
Marsh, Richard E. 435-M
Marshall, E. R. 333-G, 334-G
Marshall, H. C. 370-L
Marshall, I. A. 753-Q
Marshall, W. A. 624-L, 914-L
Marshall, W. E. 209-D
Marsham, T. N. 534-P
Marson, Ralph 561-L
Martens, Howard 61-M
Martin, D. C. 799-K
Martin, D. L. 169-M, 38-N
Martin, Don S., Jr. 405-P
Martin, Erich 167-S
Martin, F. E. 108-Q
Martin, G. 260-D, 282-E, 479-E
Martin, Howard B. 746-K
Martin, James 141-P
Martin, Joseph 803-Q
Martin, P. McA. 279-E
Martin, R. S. 296-S
Martin, William J. 145-P
Martinez, A. W. 381-D
Martius, Ursula M. 213-N,
. . . . . 601-P, 761-Q
Martorell, Jose Terraza 223-Q
Martyn, P. L. 136-T
Marx, J. W. 563-P, 320-Q
Marzke, Oscar 83-V
Masi, Oscar. 454-R
Masin, Charles B. 943-L
Masing, Georg 232-A,
. . 28-M, 195-P, 197-P, 452-P, 141-Q
Maske, William 39-A, 40-A
Mason, John F., Jr. 99-R, 332-R
Mason, Mary A. 168-L,
. . . . . 239-L, 308-L, 557-L, 729-L
Mason, Warren P. 519-Q
Massalski, T. B. 429-P, 330-Q
Mässenhausen, Walter von . . . 207-M
Mässing, Werner 16-C
Masteller, Richard D. 89-B
Masumoto, Hakaru 98-P
Mathesius, Walther 14-A
Mathews, Donald R. 265-J
Mathews, J. C. 561-P
Mathewson, C. H. 140-N, 440-Q
Mathias, James N. 296-E
Mathiaschitz, A. 32-S
Mathur, G. P. 318-A, 272-B
Matsumoto, Hisao 369-Q
Matsumura, G. 14-H
Matsuura, Yuji 7-F, 850-Q
Matsuzaki, Yoshinobu 245-N
Matthaes, Kurt 747-Q
Matter, Jean 285-T
Mattern, O. 75-Q
Matthaes, Kurt 562-Q, 97-S
Matthews, J. W. 11-R
Matthews, Willard 39-A
Matthias, B. T. 461-P
Matthysse, Irving 105-T
Matting, A. 653-K, 655-K, 1063-Q
Mattson, I. C. 81-K
Matulaitis, V. E. 147-G
Matuschka, B. 143-D, 203-D
Mauer, Joseph 200-J
Maurer, Joseph 187-N
Maurer, R. 354-M
Maurin, A. J. 520-R
Mawhinney, M. H. 274-J
Mawson, D. L. 356-T
Maxon, Glenway 271-G
Maxwell, E. 293-P
Maxwell, J. A. 463-S
May, J. D. 139-D
May, Thomas P. 89-R
May, W. 373-M, 251-N
Mayer, A. 204-M, 388-P, 221-S
Mayer, J. E. 25-N
Mayer, James W. 567-E
Mayer, Karl 186-D
Mayer, Natalie 508-R
Mayfield, R. M. 22-J
Maykuth, D. J. 9-M
Mayne, C. R. 605-Q
Mayne, J. E. O. 644-L
Mayo, B. J. 14-L
Mayorcas, R. 49-S
Mays, William A. 105-K
Mazel, A. G. 111-K, 272-K
Mazzaferri, Joseph W. 521-T
Mead, H. W. 294-N
Meagley, Nelson G. 428-S
Meakin, K. S. 298-K
Mears, R. B. 281-R

Mee, C. D. 128-P, 129-P
Meggers, William F. 85-S, 322-S, 517-S
Mehl, Robert F. . . . . 263-A, 219-D, . 14-N, 55-N, 115-N, 212-N, 268-N, . .679-Q, 680-Q, 683-Q, 706-Q, 878-Q
Mehlig, J. P. 91-S, 317-S
Meier, J. W. 755-Q
Meier-Cortés, Ernst 168-D
Meierkord, E. H. 428-P
Meijering, J. L. 49-R
Meikle, G. 162-V
Meilink, J. 593-E
Meinel, M. P. 364-G
Meinhart, W. L. 90-Q
Meissner, Hans 282-P
Meister, J. P. 351-E, 579-E
Meiswinkel, Helmut 973-L
Meites, Louis 431-S
Melcher, Norwood B. 95-A
Melhardt, Hans 624-K
Mellgren, Svante 247-P, 581-P
Mellon, M. G. 271-S
Mel'nikov, P. A. 490-K
Melnitsky, Benjamin 289-A
Meloche, V. W. 124-C
Menard, D. F. 902-L
Mendel, L. 669-L
Mendelssohn, K. 22-P, 176-P, 375-P, 502-P
Mendizza, A. 195-R
Mendoza, E. 479-P
Mends, D. N. 10-Q, 484-Q, 741-Q, 897-Q
Menegoz, D. 137-C
Mengel, A. C. 316-R
Meninger, Frank 484-G
Mentor, J. W. 200-M, 301-N
Mentch, Robert L. 95-A
Menzel, Erich. 277-N
Mercer, A. D. 226-R
Mercer, R. A. 533-S
Merchant, H. J. 282-F, 308-F
Merchant, M. E. . . . . 53-G, . .105-G, 340-G, 381-G, 452-G, 453-G
Meredith, W. C. 617-E
Meriam, J. L. 589-Q
Meriel-Bussy, H. 460-S
Mering, J. 143-M
Merikanto, Bengt 222-S
Merkel, H. 103-P
Merker, R. L. 174-P
Merrill, Charles White . . 95-A, 250-B
Merriman, A. D. 193-A, 262-A, 357-A, . . 378-A, 69-V, 163-V, 197-V, 207-V
Merrithew, William S. 125-R
Mershon, Carroll B. 12-J
Merton, H. J. 931-L
Mertz, J. C. 214-R, 168-T, 215-T, 385-T
Mery, Robert 479-S
Mescher, John A. 169-E
Mesick, Benjamin S. 65-T, 83-V
Mesnard, G. 102-P
Metaxas, T. 12-A
Metcalf, P. 175-Q
Metzger, L. H. 518-G
Metzger, L. R. 155-G
Metzger, M. 208-Q
Meunier, L. 548-L
Meyer, C. W. 217-D
Meyer, F. R. 952-L
Meyer, H. 506-P
Meyer, Helena M. 95-A
Meyer, M. A. 920-Q
Meyer, John P. 71-V
Meyer, Lothar 252-P
Meyer, M. A. 286-Q
Meyerhans, K. 572-K
Meyer-Rässler, E. 491-L, 738-L, 825-L, 956-L
Meyers, O. B. 205-J
Meyersberg, Gustav 338-Q, 731-Q
Meynet, G. 737-L
Meynier, A. 162-G
Meyrick, T. J. 333-K
Miceli, A. S. 142-K
Michael, A. B. 76-M
Michael, A. D. 50-V
Michal, E. J. 263-B
Michalos, George P. 158-V
Michaud, M. M. 42-S, 49-S
Michel, André 91-J, 187-P, 576-P, 63-V
Michel, Pierre 947-L
Michell, F. B. 245-B
Michie, G. M. 28-S, 241-S
Mickel, E. 1038-Q
Mickelson, C. G. 987-Q
Mickey, Bruce D. 147-F
Miekk, H. M. 385-G, 224-N
Miekkoja, H. M. 1027-Q
Mielentz, Wolfgang 1062-Q
Mikailoff, Alexandre 66-L
Mikhailov, G. P. 430-K
Mikheeva, V. I. 297-M
Mikulak, John 134-K, 415-K
Mikulinskii, A. S. 91-C
Miles, L. D. 117-A
Millan, Francisco 84-D
Millard, D. J. 449-Q
Millard, F. 199-R, 200-R
Miller, Carl 162-R
Miller, Christina C. 2-S, 99-S
Miller, E. T. 699-L
Miller, Fenton 167-T
Miller, G. A., Jr. 342-T
Miller, George E. 198-E
Miller, G. L. 58-H, 9-V

Miller, Henry A. 214-S
Miller, H. J. 194-A, 38-F
Miller, James 774-Q
Miller, J. Garnett 364-D
Miller, K. G. 139-A
Miller, Leon F. 372-E
Miller, L. G. 208-J
Miller, O. O. 607-Q
Miller, P. H., Jr. 461-M
Miller, R. R. 121-E, 64-P
Mills, C. H. G. 175-Q
Mills, Charles S. 89-S
Mills, Kenneth N. 239-K
Milne, A. A. 1002-Q
Milner, G. W. C. 26-S, 100-S
Minkler, W. M. 209-V
Minton, Roy H. 893-L
Mintrop, H. 793-Q
Mintrop, Robert 272-J
Mirgalovskaia, M. S. 46-M, 260-M
Mironoff, N. 337-Q, 823-Q
Miropol'skii, Z. L. 459-M
Miroshnichenko, I. S. 275-K
Miskell, Ford F. 345-B
Miskoe, W. I. 213-F
Missier, G. 359-R, 14-V
Mitbauer, Heinz 928-Q
Mitchell, A. J. 379-L
Mitchell, E. 253-J
Mitchell, E. W. J. 79-P
Mitchell, G. P. 415-S
Mitchell, John 355-A
Mitchell, J. W. 79-P
Mitchell, Russel F. 405-P
Mitchell, W. I. 1069-Q
Mitchell, Will, Jr. 345-B
Mitsche, Roland 594-E, 48-N, 514-Q
Mitsuhashi, Tetsutaro 367-Q, 370-Q, 183-R
Mitton, F. 10-D
Mochrie, W. G. 82-A, 36-C
Moder, J. J. 106-B
Modin, Sten 230-M
Moehl, H. 199-A
Moen, W. B. 249-K
Mogaray, Andre 204-T
Mogerman, W. D. 545-R, 275-S
Mohler, J. B. 167-L, 439-L, 484-L
Mohling, Margret 197-P
Mohr, G. 349-L
Mohri, A. F. 36-F
Moiseevich, S. I. 238-B
Molé, Roger 34-H
Moliere, K. 414-P
Moller, E. W. 318-M
Möller, Herman 216-Q
Moller, H. M. 975-Q
Moment, Sam 219-A
Mondolfo, L. F. 13-C, 35-F
Moneyron, M. 54-K
Montalenti, G. 406-P
Montanus, R. C. 243-Q
Montariol, Frederic 454-M
Montchatre, G. 411-T
Moody, L. E. 972-Q
Mooers, A. B. 252-F
Moore, A. C. 982-Q
Moore, A. H. W. 160-N
Moore, A. J. W. . . . 625-L, 262-M, 573-Q
Moore, A. K. 120-D
Moore, D. C. 8-K
Moore, Dwight G. . . . . 98-L, 168-L, . . 239-L, 308-L, 557-L, 729-L, 917-L
Moore, G. A. 909-Q
Moore, George L. 891-Q, 993-Q
Moore, H. Earle 429-S
Moore, L. F. 208-D
Moore, R. L. 1073-Q
Moore, T. I. 157-C
Moore, Walter J. 994-L, 69-N, 266-R, 354-R
Moore, W. H. 87-E, 250-K
Moore, William B., Jr. 228-T
Moore, William C. 15-R
Moore, W. R. 6-P
Mooser, E. 70-P
Mora, A. 145-R
Moraes, Manoel A. 596-E
Moral, F. del 822-Q
Moravia, G. 384-Q
Mordvintsev, L. A. 110-K
More, Ch. 133-V
Moreau, A. 53-K
Morel, Frederic 1031-Q
Moresseé, G. 740-L
Morey, R. E. 133-E
Morgan, C. R. 529-T
Morgan, D. W. 87-B
Morgan, I. G. 257-S
Morgan, J. 238-E
Morgan, M. F. 163-B
Morgan, T. 47-K
Mori, Toshisada 464-M
Morlet, E. 510-Q, 149-T
Morley, J. I. 111-M, 1014-Q
Moroz, W. J. 324-P
Morral, F. R. 107-M, 471-M
Morral, Fred A. 79-A
Morrell, Lester G. 134-A
Morris, D. O. 159-A
Morris, J. P. 499-P
Morris, L. D. 23-Q
Morris, T. M. 241-B, 306-B
Morrogh, H. 112-E, 498-Q
Morse, L. M. 100-R
Mortimore, D. M. 499-S

Mortimer, Frances 255-F, 310-F, 147-S, 256-S
Mortimer, John W. 445-K
Morton, B. B. 4-R
Morton, Harry 338-D
Morton, H. S., Jr. 845-Q
Morton, P. H. 224-R
Morton, R. J. 167-B
Mörtsell, Sture 86-B
Mosborg, R. J. 603-Q
Moschel, W. 34-C
Moser, F. 361-B
Moses, D. P. 307-L
Moskowitz, David 396-M
Moss, C. J. 50-K
Moss, M. L. 141-S
Moss, T. S. 78-P
Mossoux, R. 501-T
Mostovetch, Nicolas 192-L, 134-P
Motherwell, George W. 181-F
Mott, B. W. . . . . 461-L, ... 390-M, 391-M, 483-P, 216-R
Mott, N. F. 475-M, 779-Q
Mott, N. S. 21-V, 109-V
Motte, A. Gourlez de la 817-Q
Mouflard, Michel 111-N
Moulen, A. W. 594-L
Moulton, R. W. 286-B, 32-C
Mourik, J. H. O. Van 230-S
Mowat, J. M. 53-T
Mowatt, J. A. S. 714-L
Moxley, G. O. 753-Q
Moyal, Maurice 336-A, 356-A
Moyer, B. J. 269-P
Muan, Arnulf 112-B, 328-B, 339-B, 271-D
Muckle, W. 92-T
Muehlenkamp, G. T. 195-Q
Mueller, Ernest 311-L
Mueller, John 88-F
Muhlberger, Horst 671-L
Muhlenbruch, C. W. 605-Q
Muir, D. C. 282-D
Muir, Gilbert P. 490-G
Muir, J. W. 56-S
Muir, N. B. 37-Q
Mulcahy, Bernard P. . . . 115-E, 200-E . . 358-E, 407-E, 437-E, 615-E, 643-E
Mulcahy, E. W. 151-A
Mulharad, Wolf 26-A
Müller, E. 127-K, 487-T
Müller, E. A. W. 75-S, 349-S
Müller, F. H. 720-Q
Müller, Gotthold 159-Q
Müller, J. 309-T
Müller, P. 583-L
Müller, W. 127-Q
Müller-Busse, A. 571-K, 1063-Q
Mullins, L. 155-S
Munch, Ralph H. 734-Q, 274-S
Munesue, Seiji 241-P
Munoz del Corral, Francisco . . 66-N
Munns, J. J. 57-L, 191-L
Munoz del Corral, Francisco . . 109-P
Munse, W. H. 16-Q, 603-Q, 613-Q
Murad, A. B. 262-B
Muraire, Raymond 98-C
Muraki, Tsunemitsu 24-E, 549-E
Murdock, Harold R. 60-A, 140-A
Murdza, N. H. 617-Q
Murfitt, R. H. 477-S
Muriset, Gaston 399-P
Murkes, J. 499-Q
Murnaghan, Francis D. 495-Q
Murphy, A. J. 74-B, 242-B
Murphy, Daniel J. 293-A
Murphy, J. J. 277-G, 86-Q
Murphy, Nelson F. 440-L
Murphy, Robert J. 322-S
Murray, J. R. 359-M
Murray, S. F. 96-Q
Murton, A. E. 63-E
Musgrave, J. R. 205-V
Musted, G. G. 147-K
Mustin, Gordon S. 212-L
Muthuswamy, R. 389-D
Muto, Y. 495-P
Myers, E. M. 240-B
Myers, James W. 493-R
Mysell, Max 839-L
Myskowski, E. T. 68-E, 310-E
Mykura, H. 97-N

N

Nabarro, F. R. N. 748-Q
Nachtigall, Eduard 950-L, 351-Q
Nadai, A. 655-Q
Nadherny, Fred 209-V
Naeser, Gerhard 112-H
Nagai, Kenzo 104-L
Nagasaki, Kyuya 422-M
Nagashima, Sukeo 255-J
Naghdi, P. M. 960-Q
Nagy, John 26-H
Nakagawa, Ryuichi 367-Q
Nakamura, Yuzo 287-N
Nakano, Minao 7-N
Nakazawa, Gen-ichi 120-H
Nann, H. 155-L
Nappiras, E. A. 674-K
Narayanan, P. I. A. 318-A, 272-B, 273-B, 274-B
Narcus, Harold 334-L
Nash, R. R. 170-Q
Nason, W. C., Jr. 52-Q
Nathans, R. 593-P

Nathason, M. Jordan 30-E, 100-E, 122-E
Nauton, B. 233-N
Navarro Alvargonzalez, Jose M. 65-N
Naylor, C. E. 201-L
Nazarov, S. T. 369-K
Neal, B. G. 8-Q, 936-Q
Nechaev, V. D. 268-K, 557-K
Nedoluha, A. 150-P, 579-P
Nedzvetskii, G. V. 403-K, 480-K
Needham, J. C. 365-K
Needleman, Stanley 95-A
Neel, Louis 596-P
Nehl, Franz 356-K, 940-Q
Nehrenberg, A. E. . . 307-M, 16-N, 60-N
Neifel'd, I. E. 302-Q
Neighbours, J. R. 473-Q
Neill, D. 258-E
Neinacher, Gerhard 560-Q
Nekervis, Robert J. 911-L
Nelson, F. G., Jr. 748-K
Nelson, F. W. 90-R
Nelson, G. A. 425-R
Nelson, H. R. 31-M, 188-M
Nelson, James A. 4-H
Nelson, K. E. 94-Q
Nelson, R. G. 153-C
Nelson, R. L. 81-K
Nemec, Josef 321-L
Nepper, M. 324-D
Neppiras, E. A. 325-A
Nerhood, H. E. 307-R
Nesbitt, E. A. 168-M, 327-P
Nesterova, M. D. 137-M
Netherton, L. E. 171-L
Neuenkirchen, H. v. 56-K
Neuhaus, A. 415-M
Neuhaus, Werner 342-Q
Neunzig, H. 277-R
Nevers, R. P. 136-A
Newall, A. P. 115-F
Newby, B. J. 317-S
Newby, M. P. 79-D
Newcomb, Evans 401-L
Newell, G. S. 581-K
Newell, H. D. 242-Q, 556-T, 161-V
Newhall, H. S. 182-D
Newhams, W. C. 319-E
Newhouse, V. L. 336-P
Newiger, W. 55-K
Newkirk, J. B. 38-N, 256-N
Newkirk, Lester L. 294-P
Newman, D. P. 673-Q
Newmark, N. M. 603-Q, 1080-Q
Newnham, I. E. 47-B
Newson, A. J. 184-K
Newton, Clarence J. 180-P
Newton, T. L. 127-J
Nicholas, J. F. 8-M, 17-M
Nicolas, Pierre 500-E, 652-E
Nicholas, T. E. 398-R
Nicolau, P. 377-S
Nicolaus, H. O. . . . 83-R, 12-V, 143-V
Nicholls, G. W. 239-S
Nichols, Malcolm A. 248-T
Nicholson, M. E. 56-N
Nickelsen, D. 841-L, 257-T
Nickols, D. G. 448-Q
Nicotera, Ernest T. 73-F
Nidrabsey, C. P. 249-L
Niebuhr, Johannes 508-P
Niederhuemer, R. 238-R
Niedermeyer, Otto 362-L
Niekerk, J. N. van 309-M
Nielsen, O. 139-C
Nielsen, Richard L. 38-B
Niemann, G. 787-Q, 1044-Q
Niezoldi, O. 464-R
Nightingale, A. 67-T
Nijhawan, B. R. . . 107-Q, 539-Q, 1056-Q
Nikiforov, G. D. 109-K
Nikitin, Iu. P. 268-B, 347-P
Niklewski, B. K. 991-L
Nikolaev, G. A. 429-K
Nikolaichik, M. N. 190-G, 250-G
Nikonorova, A. I. 104-N
Nilsen, A. A. 165-B
Ninburg, A. K. 242-G
Nippes, Ernest F. 22-K, 104-K, 245-K, 667-K
Nishihara, Kiyokado 359-B
Nitskevich, E. A. 267-D
Nix, F. C. 520-P
Nixon, W. B. 284-T
Noland, R. L. 58-Q
Noll, Paul E. 557-T
Nonveiller, F. 20-M
Norberg, R. E. 372-P
Noren, Tore 108-K, 498-K, 580-K, 569-Q
Norgard, J. D. 191-D
Noritsyn, I. A. 273-G
Norris, C. H. 30-Q
Norris, G. M. 591-Q
Northcott, L. 118-C, 43-H, 45-H, 46-H, 47-H, 356-Q
Norton, F. H. 792-L, 492-P
Norton, J. T. 11-H, 428-M, 429-M, 901-Q
Nosenko, N. E. 117-K
Noss, O. F., Jr. 163-R
Nowacki, Werner 479-M
Nowick, A. S. 353-P, 319-Q
Nowotny, H. 23-M, 98-M, 99-M, 133-M, 152-M, 228-M, 221-Q
Novikova, O. A. 161-P
Nurse, T. J. 450-M
Nurton, A. E. 72-E
Nutting, Eugene G., Jr. 61-R

Nutting, J. 200-M, 276-M, 301-N
Nye, B. E. 78-K
Nye, J. F. 264-M, 964-Q
Nye, Willis L. 324-A
Nystrom, Wm. T. 414-S

O

Oberle, T. L. 809-Q, 831-Q
Oberti, G. 384-Q
Obrebski, John 29-J
Obringer, E. W. 416-K, 243-Q
O'Connor, D. T. 494-K, 63-S
O'Connor, Joseph A. 72-C
Oehler, Gerhard 115-G, 413-G
Oehler, I. A. 251-K, 597-K,
. . .603-K, 671-K, 687-K, 705-K, 734-K
Oelsen, Willy 179-D, 289-D, 303-D
Oestreicher, S. 87-K
Offenhauer, C. M. 904-Q
Offermann, P. F. 13-P, 140-P
Ogawa, K. 14-H
Ogawa, S. 78-M, 245-N
Ogden, H. R. 9-M
Ogura, Nobuaki 554-Q
O'Hara, T. A. 59-T
Ohman, Lachlan 120-Q
Okakura, Tsuneyuki 246-E
Okamoto, Masazo 614-E
O'Keefe, Philip 11-G,
535-L, 630-L, 47-R, 501-S, 89-V, 183-V
O'Keeffe, James, Jr. 81-E
Oketani, Shigeo 163-J, 346-M
Okress, E. C. 328-E, 408-E, 785-K
Okress, E. K. 495-E, 578-E
Okubo, S. 40-Q
Old, A. R. 181-L
Oldham, Graham 297-B
. . . . . 101-C, 170-C, 441-E, 488-S
Olette, M. 264-S
Oliver, D. S. 173-Q
Oliver, Evan M. 77-L, 371-L
Olney, M. J. 14-M, 218-M, 402-M
Olsen, J. L. 434-P, 530-P
Olsen-Bär, Marianne 36-P
Ol'shanskii, Ia. I. 87-N, 160-P
Ol'shanskii, N. A. 486-K
Olson, G. B. 119-J
Olson, W. Z. 545-K
Olt, T. F. 142-G
Ong, J. N. 233-B
O'Neill, Hugh 215-M
Ongaro, Mario 447-S
Onion, G. A. 606-L, 615-L
Onitsch-Modl, Emma-Maria . . . 48-N
Onsager, L. 531-P
Onstad, Nordahl I. 48-B
Onuma, Ichiro 368-Q
Oosterhout, H. A. van 227-S
Opinsky, A. J. 42-Q, 189-Q, 325-Q
Opitz, H. 293-G, 470-G
Oranskaia, M. A. 59-R
Orbaugh, M. H. 488-L
Orciuch, C. J. 44-F
Order, Dean Van 271-E
Orehoski, M. A. 211-J
O'Reilly, J. T. 117-G
Orem, Theodore H. 318-R,
. . . . . 327-R, 329-R, 365-R, 438-R
Oriani, R. A. 83-M
Orlamünder, Erika 69-M
Orlov, A. A. 513-P
Ormont, B. F. 259-P
O'Rourke, James C. . . . 475-G, 479-G
Orowan, E. 658-Q
Orr, C., Jr. 77-H, 128-H
Orr, Stanley C. . . . . .
82-L, 578-L, 662-L, 179-R
Orths, Kurt 550-S
Orton, George W. 314-R, 353-R
Orton, L. H. 365-K
Osawa, Makoto 976-Q
Osborn, E. F. . . . 328-B, 339-B, 271-D
Osborn, Oliver 190-R
Osipov, K. A. . . . 155-M, 303-Q, 723-Q
Oskarson, Valde 123-T
Ostapenko, N. G. 230-K, 433-K
Ostapkovich, P. L. 296-N
Osterberg, Harold 27-M
Ostrander, C. W. 852-L
Ostrof, Bernard 278-A
Oswald, M. 100-V
Ota, Waichi 979-Q
Ots, Y. 179-S
Otsuka, Minao . . . 400-E, 545-E, 546-E
Ott, Burl E. 601-K
Ott, Ellis R. 427-S
Ottignon, R. F. 119-E, 340-E
Ottmar, Jerome 986-L
Otvos, J. W. 1021-Q
Oussani, James J. 18-T
Outwater, J. O. 335-G
Overkott, F. J. 94-J
Owadano, Tosiro 66-Q
Owe Berg, T. G. 40-R
Owen, C. J. 834-L
Owen, E. A. 199-M
Owen, E. R. 188-L, 564-T
Owen, Louis E. 59-S
Owen, W. S. . . . . .
50-M, 51-M, 170-M, 427-M, 241-N
Oxford, W. F., Jr. 269-R
Oya, Shigeo 22-E, 849-Q
Oyama, Tadashi 81-B, 228-B
Ozerov, R. P. 229-M

P

Paasche, O. G. 41-M
Pace, A. L. 293-S
Packard, W. V. 341-A, 213-B
Padogin, A. A. 359-G
Page, Benjamin M. 307-B
Page, W. C. 346-A
Paghis, I. 423-P
Paglialunga, L. 272-T
Pahlitzsch, G. 307-G
Paic, Mladen 148-M
Painter, L. A. 157-C
Painter, R. A. 315-L
Painter, R. J. 115-S
Pajak, T. P. 42-T
Pakulla, Edmund 189-D
Palacios, Julio 311-P
Palatnik, L. S. 86-N
Palazzi, A. 252-E
Pal'chuk, N. Iu. 467-K
Palisca, A. 525-S
Paliwoda, E. J. 872-Q
Palm, J. H. 1059-Q
Palme, R. 94-H
Palmer, E. W. 59-M
Palmer, Frederick H. 324-E
Palmer, G. H. 533-P
Palmer, S. W. 648-E
Palmer, T. J. 758-K
Palmer, W. F. 5-K
Palmer, W. P. 285-B
Palmer, W. W. 33-L
Pamfilov, A. V. 179-Q
Pamment, R. T. 11-S
Panchenkov, G. M. 153-P
Pankove, J. I. 569-T
Pankratov, N. A. 158-G
Panlener, Frank 232-J
Pannek, Hans 100-F, 153-J
Pao, Yoh-Han 685-Q
Papen, G. W. 56-F
Paproth, H. 415-P
Papsdorf, Werner 139-F
Parcel, R. Wayne 212-N
Pardue, T. E. 738-Q
Paret, Richard E. 539-R, 253-T, 344-T
Parfenov, G. S. 474-R
Pariaud, J. C. 450-R
Parina, John, Jr. 294-A, 151-J, 161-V
Park, Albert S. 45-G
Park, L. H. 365-G
Parke, R. M. 114-M
Parker Charles M. 36-V
Parker, Earl R. 433-Q, 988-Q
Parker, Edward A. 53-L, 114-L
Parker F. H. 46-K, 144-K
Parker, Harry 84-Q
Parker, H. M. 124-D
Parker, Marshall E. 156-R
. . 178-R, 187-R, 204-R, 211-R, 315-R
Parker, R. 5-P, 484-P
Parker, Steward C. 51-E
Parkes, A. R. 11-E, 325-E
Parkes, G. D. 116-B
Parkes, W. B. 305-E
Parkins, R. N. 517-R
Parkinson, D. H. 216-P
Parkinson, ...
. . . . . 58-L, 478-L, 722-L, 861-L
Parks, John M. 9-P
Parks, Roland D. 102-V
Parnham, C. W. 62-S
Parr, J. Gordon 304-M
Parrat, C. O. 418-G
Parravano, Giuseppe . . . 170-P, 400-P
Parry, E. 457-L
Parsons, A. C. 89-S
Paschkis, Victor 10-E
. . . . . 57-E, 80-E, 294-E, 332-E
Pascoe, Walter 46-R
Pasgaud, Claude 9-C
Pashley, D. W. 79-R
Pass, A. 627-L
Pasynkov, R. E. 106-P
Pate, W. 644-Q
Paterson, D. L. 185-Q
Paterson, M. S. 389-M
Paton, C. P. 81-J
Patterson, Byran 368-R
Patterson, W. S. 347-R
Patton, T. L. 14-G, 175-G, 260-G, 326-G
Patton, W. G. . . 10-B, 292-F, 474-G,
. . 99-J, 216-J, 217-J, 25-K, 567-L,
. 591-L, 710-L, 500-Q, 191-T, 335-T
Paul, Leslie 691-Q
Paul, Ralph G. 57-B, 8-V
Pauling, Linus . . . 118-M, 301-M, 435-M
Paulson, C. F. 190-A, 207-A
Pavesic, Edward J. 162-J, 191-J
Pavlinchenko, M. M. 64-C
Pavlov, M. A. 276-D
Pavlova, M. V. 249-R, 279-R
Pawel, George W. 150-C
Pawlek, F. 53-P
Pawlek, R. 489-P
Paxton, H. W. 330-Q
Payne, J. M. 50-V
Payne, Lyle L. 538-T
Payne, R. J. M. 87-J, 743-Q
Payne, S. T. 256-S
Payson, P. 235-J
Peabody, A. W. 63-R, 431-R
Peabody, S. A. 145-C
Pearce, J. G. 276-E, 654-E
Pearce, R. 117-M

Pearson, B. M. 266-J, 481-T
Pearson, C. F. 237-A
Pearson, E. C. 460-M, 536-R
Pearson, G. L. 567-T
Pearson, J. 369-A
Pearson, John 474-Q, 699-Q
Pearson, T. G. 12-C
Pearson, W. B. 66-M
. . . . . 240-M, 245-M, 393-M, 200-N
Pease, William 439-G
Peaslee, Robert L. 662-K
Peavler, Robert J. 75-M
Pedder, J. W. G. 153-D
Pedrick, A. S. 66-S
Peeples, R. M. 196-F
Pehrson, Elmer W. 197-B, 251-B, 352-B
Peirson, D. H. 6-S
Peissi, P. 240-T
Peletier, L. A. 308-G
Pell, E. M. 586-P
Pellini, W. S. 68-E, 85-E,
86-E, 297-E, 310-E, 511-E, 522-E,
576-E, 642-E, 274-K, 703-K, 751-K,
. . . 34-N, 40-N, 51-N, 427-Q, 1081-Q
Pell-Walpole, W. T. 126-E
Pemberton, R. 358-S
Penfold, A. S. 275-P
Pennock, John C. 82-S
Penrose, C. A. 894-Q
Pentland, N. 554-P
Penton, Hugh 487-L
Pentz, P. G. 202-E, 250-E, 618-E
Peoples, R. S. 518-R
Pepkowitz, Leonard P. 270-S
Pepper, K. W. 322-K
Pepperhoff, Werner 38-D
Perakis, Nicholas 573-P
Percy, Allan L. 222-R
Percy, J. W. 404-S
Pereira, Rubens Lima 82-Q
Perekalina, T. M. 509-P
Peretti, E. A. 386-M
Perkins, E. C. 2-C
Perkins, F. C. 880-Q
Perminov, P. S. 513-P
Pernoux, Emile 120-M, 262-S
Perret, Hans 787-Q
Perrier, A. L. 185-P
Perrin, T. S. 88-B
Perrot, Marcel 581-L,
. . . . . 278-P, 446-P, 525-P
Perry, Charles F. 776-K
Perry, Douglas 506-R
Perry, E. J. 275-B
Perry, James W. 19-A
Perry, K. P. 23-S
Perry, T. E. 134-C
Perryman, E. C. W. . . . 461-L, 776-L
Pershin, P. S. 253-E
Pertierra, Jose Manuel 167-P
Pertsovskii, N. Z. 270-K
Pertusini, Raimund 225-K, 712-K
Pesante, Manlio 154-J, 245-J
Pesout, Edward 163-C
Pesses, Marvin 249-A
Petch, M. K. 459-L, 467-L, 220-R
Petch, N. J. 546-Q
Peter, W. . . 212-G, 522-G, 28-J, 122-J
Peters, W. A. 338-D
Petersen, A. H. 7-V
Petersen, Glenn R. 503-S
Peterson, C. 311-F, 405-M
Peterson, E. R. 251-J
Peterson, E. T. 29-F, 311-F
Peterson, H. Spencer 459-T
Peterson, Marshall B. 639-Q
Peterson, R. A. 294-S
Peterson, R. E. . . . . .
. . . . . 227-Q, 746-Q, 967-Q
Peterson, R. G. 350-B
Peterson, S. W. 481-P
Peterson, Walter E. 282-L
Petit, Daniel 384-D
Petit, J. 169-K
Petran, K. V. 241-T
Petrdlik, Miroslav 84-H, 131-Q
Petri, R. 971-L
Petrman, Ivo 160-D
Pettersson, Holger 60-E
Pettit, Grant A. 85-A
Peyrou, Charles 341-P
Peyssart, F. 995-Q
Pfann, W. G. . . . 74-D, 210-N, 315-N
Pfeifer, Friedrich 84-P
Pfeiffer, H. 357-R
Pfeiffer, John 372-A, 43-J
Pfeiffer, R. 574-K
Pfeil, L. B. 507-Q
Pfield, Paul 45-R, 92-R
Pfister, Frank 556-E
Pfützenreuter, August 195-P
Phalnikar, C. A. 321-R
Phelps, George M. 272-Q
Phelps, H. C. 470-R
Phelps, R. A. 707-K
Philippoff, W. 122-B, 179-B
Phillippowich, Alexander 293-R
Phillips, Arthur L. 442-G,
. . . . . 35-L, 667-L, 836-L
Phillips, C. E. 525-Q, 526-Q
Phillips, Charles W. 130-N
Phillips, Garnet P. 75-T
Phillips, M. D. 7-S
Phipps, G. S. 601-Q
Piatti, L. . . 139-R, 492-R, 535-R, 10-V
Picarazzi, J. J. 159-R

Picard, M. F. 377-S
Pichaud, M. 137-T
Pick, J. J. 260-D
Pickering, F. B. . . 195-D, 112-M, 63-P
Pickett, K. L. 119-G, 130-G, 140-G
Pickus, Milton R. 443-Q
Pidgeon, L. M. . . . 7-C, 164-C, 516-P
Pierce, Albert L. 126-C
Pierce, J. C. 432-S
Pierce, J. J. 494-K, 35-S
Pierce, Robert R. 526-L, 672-L
Pierce, W. B. 14-L
Pierree, Claire 404-M
Pietilainen, Lauri 569-Q
Pietrokowsky, Paul . . . 89-M, 237-M
Pietruck, Christel 18-C
Pigott, R. J. S. 86-G,
. . . . . .220-G, 399-G, 520-G
Pilia, F. J. 320-K
Pillon, Clarence F., Jr. 506-R
Pilz, Peter 196-P
Pines, David 242-P
Pinkerton, H. L. . .128-A, 224-A, 832-L
Pinner, R. 935-L
Piontelli, R. . . . . .
. . . . . 243-A, 547-L, 2-P, 283-P
. .318-P, 319-P, 320-P, 321-P, 299-R
Piper, R. S. 163-K
Piper, T. E. 9-S, 55-S, 510-T
Piper, Thomas A. 306-K
Pirner, E. J. 361-S
Pitkin, W. R. 72-H
Pitts, Joseph W. 98-L,
. .501-L, 543-L, 554-L, 638-L, 917-L
Piwowarsky, Eugen . . . 409-E, 492-T
Piza, Fernando A. de Toledo. . 29-D
Pizzuto, Carlo 739-L
Plaksin, I. N. 181-B, 182-B, 59-P
Planner, Bernard P. 562-T, 117-V, 156-V
Planting, Charles O. 745-K
Plaster, H. J. 203-L
Platon, J. G. 176-D, 786-Q
Pleines, E. W. 397-K, 268-T
Plesinger, Adolf M. 290-E
Plöckinger, Erwin 37-D, 274-D
Plottner, Dietmar 507-T
Pluck, J. E. 283-D
Plummer, Fred L. 95-T
Plunkett, Robert 690-Q
Pocock, Bryant W. 685-L
Podgaetskii, V. V. 267-K
Podol'skaia, N. S. 215-J
Poehler, H. A. 120-P
Poehlman, W. J. 391-S
Poganski, Siegfried 361-P
Pogodin-Alekseev, G. I. . 373-K, 179-Q
Pogorecki, K. 20-J
Pohl, Ernst 72-S
Pohl, Heinz 113-S
Pohl, R. G. 20-T
Pohlman, R. 57-S
Pokorny, Adolf 242-S
Pokorny, Jean 252-M
Polakowski, N. H. . . . . .
. . 45-F, 69-F, 80-F, 136-F, 222-F,
. 260-F, 295-F, 331-F, 219-G, 25-P,
154-Q, 380-Q, 527-Q, 635-Q, 892-Q
Polansky, D. 494-K, 63-S
Polansky, V. S. 292-A
Poliakova, R. B. 377-K
Politycki, A. 670-L
Pollack, A. 363-L
Pollack, Hans 275-D
Polychrone, D. A. 30-Q
Polydoroff, W. J. 15-H
Polzin, Marvin H. 771-Q, 832-Q
Pomey, J. 132-Q, 446-Q
Pomey, M. 204-E
Pommellet, M. 575-P
Pommier, P. 377-S
Pomortesev, A. P. 370-K
Pomosov, A. V. 176-R, 177-R
Pomp, A. 281-S
Pond, M. Allen 86-A
Pond, R. B. 322-M, 18-N, 990-Q
Pool, M. L. 253-P
Poole, D. M. 327-M
Poole, L. K. 751-K
Poole, W. D. 877-L
Poole, W. H. 53-F, 78-S
Pope, Alfred H. 495-S
Popel, S. I. 268-B, 347-P
Popham, G. G. 307-L
Popova, Z. V. 163-M
Porger, G. R. 623-Q
Porteous, J. 116-F
Porter, Lew F. 132-E
Porterfield, Paul 367-G
Portevin, Albert M. 36-M, 194-R
Pospekhov, D. A. 455-P
Post, Benjamin 238-M, 279-M
Post, E. B. 9-F, 12-F
Postis, Jean de 98-C
Poth, C. G. 110-D
Potter, E. C. 236-P, 304-P
Potter, G. M. 191-B
Pottgiess, Heinz 186-D
Pottle, H. 62-G, 110-G
Potts, D. H. 533-E
Pouilly, M. L. 552-L
Poulignier, Jean 21-M, 455-M
Pound, Guy M. 165-N
Pourbaix, M 313-P,
. . 314-P, 315-P, 316-P, 258-R, 276-R
Pow, J. M. 129-Q
Powel, R. N. 197-F

Powell, A. R. 73-B
Powell, C. F. . . .432-L, 433-L, 438-L
Powell, Dawson 118-F
Powell, H. E. 94-B
Powell, R. W. . . . 35-P, 36-P, 433-P
Powell, Sheppard T. 134-R
Powers, A. E. 149-J
Powers, Robert A. 270-L
Powers, Robert E. 44-B, 76-B
Poynter, James W. 698-Q
Prager, William 1-Q, 162-Q
Prange, F. A. 999-Q, 210-R
Pratt, J. N. 190-M
Pratt, P. L. 896-Q, 198-S
Pratt, W. E. 15-R, 372-R
Preen, W. v. 147-E, 212-E
Preiser, Herman S. 435-R
Preiswerk, Phil E. 45-K
Prencipe, Giona 1091-Q
Presser, R. 450-S
Preston, D. 678-Q
Preston, J. S. 485-P
Preston, R. St. J. 231-L
Preston, W. M. 271-P
Preston-Thomas, H. 584-P
Prestrud, A. K. 1-N
Preuss, M. 267-T
Prévot, Pierre 152-T
Price, Donald 19-L
Price, J. W. 97-C, 416-S, 475-S
Price, W. J. 272-S
Prieur, Gottfried 264-D
Prikos, Paul 215-G
Primm, G. 197-F
Pritchard, W. H. 49-S
Privoznik, L. J. 743-K
Probert, Alan 264-A
Prochaska, Frantisek 214-D
Promisel, N. E. 620-K, 362-T
Pronov, A. P. 64-N
Prot, Marcel 133-Q
Pry, R. H. 404-P, 994-Q
Pryor, E. J. 118-C
Przybyla, E. 188-R
Pufahl, H. R. 122-G
Pugh, S. F. 896-Q
Pumphrey, W. I. 161-V
Püngel, Wilhelm 22-F, 264-K
Purchas, J. G. 766-K
Purelli, A. J. 17-Q
Pursey, H. 250-Q
Putilova, I. N. 147-R
Putman, J. L. 94-S
Putman, J. W. 331-P
Puttick, K. E. . . 501-Q, 735-Q, 986-Q
Puzak, Peter P. 1081-Q
Pyles, Russell 135-L
Pyszka, A. 375-T

Q

Quaas, J. 102-K, 449-K
Quadt, R. A. 123-F, 172-F, 272-F
Queneau, B. R. 116-N
Quenedy, J. P. 164-D
Quigley, Henry C. 276-S
Quincy, Lazare 174-D
Quinnell, E. H. 148-P
Qurashi, M. M. 141-M

R

Rabald, Erich 33-R
Rabezova, V. I. 122-M
Rabinowicz, Ernest 34-Q, 41-Q, 846-Q, 973-Q
Rabkin, D. M. 267-K
Rabotnov, Iu. N. 865-Q
Race, A. T., Jr. 10-T
Racelot, Bernard 288-T
Rachinger, W. A. 270-Q, 437-Q, 1000-Q
Radcliffe, R. S. 140-V
Raddant, R. D. 252-B, 438-T
Radeker, W. 356-R
Radlett, Herts 538-K
Radley, J. A. 90-S
Radtke, S. F. 235-M
Rae, W. D. 509-K
Raether, H. 203-M, 208-M, 152-N, 441-S
Raeuchle, R. F. 119-M
Raffelsieper, Josef 41-H, 70-H, 88-H, 105-Q
Ragg, Manfred 326-L, 239-R
Rahmel, A. 288-P
Raimes, S. 217-P
Rains, E. M. 84-F, 224-G, 611-K, 795-K
Rains, Charles F. 10-S
Rainwater, L. J. 277-P
Raistrick, B. 282-R
Rait, J. R. 36-B, 71-N
Rakhmarova, M. A. 248-G
Rakowski, L. 458-L, 466-L
Ralston, Oliver C. 106-V
Ramachandran, E. G. . . 785-Q, 1058-Q
Ramanathan, K. G. 435-P
Ramberg, Walter 570-Q, 621-Q
Ramser, Ernst 207-T
Ramsey, J. A. 305-N, 701-Q
Ramsey, Lyle B. 401-Q
Ramsey, R. B. 329-T
Ranc, Gaston 582-L, 92-N
Randall, H. M. 81-S
Randall, R. F. Y. 646-Q
Randich, E. A. 70-G, 86-J
Ransom, J. T. 679-Q, 683-Q
Rapatz, Franz 198-D

Rappini, Giorgio 1091-Q
Raring, F. W. 64-E
Raring, R. 419-Q, 618-Q
Rasmussen, R. T. C. 65-B
Rassbach, H. P. 61-D, 109-D
Rassokhim, V. Ia. 247-G
Rathenow, G. W. 95-N, 49-R
Rathje, W. 415-P
Ratinov, V. B. 529-R
Ratner, S. B. 724-Q
Ratze, G. 280-S
Raub, Ernst 206-M, 256-M
Rauh, C. 368-E
Rauner, Vaclav 92-F
Rauscher, Walter 123-Q
Rautala, Pekka 428-M
Ravery, Michel 72-Q, 112-Q, 177-Q, 336-Q
Ravich, M. B. 62-B
Raymond, Richard C. 181-M
Raymond, Walter A. 144-L
Raymondin, Louis 137-Q
Read, Harold J. 20-V
Read, T. A. 1070-Q
Read, W. T. Jr. 311-M, 313-M, 310-Q, 317-Q
Reardon, E. J. 134-L
Reason, R. E. 60-L, 118-L
Rebholz, R. W. 146-D
Redden, Thomas 5-M
Redfern, D. 342-E
Redmond, J. C. 376-S, 81-V
Redmond, R. L. 51-L
Redshaw, S. C. 409-K, 770-K
Reed, Lewis B. 398-E, 206-J
Reed, Thomas F. 85-A
Reents, A. C. 41-A, 329-A
Rees, J. 251-G
Rees, J. A. 166-C
Rees, W. P. 201-D, 13-Q
Reese, D. J. 808-Q
Reeve, L. 308-D
Refinetti, Renato 49-E
Register, C. L. 1-E
Rehder, C. E. 277-J
Rehder, J. E. 25-J, 41-J, 109-M, 231-M, 93-Q
Reichard, E. C. 324-R, 440-R
Reid, Keith K. 430-R
Reid, Robert B. 333-M
Reilley, E. M. 402-P
Reimann, Martin 141-F
Rein, Arthur 57-D
Reinartz, Leo 353-D
Reinbach, Rudolf 300-Q
Reinfeld, H. 27-D
Reinhard, A. E. 118-D, 122-D
Reinhart, Fred M. 170-Q, 116-R
Reinhold, Jean . . . 151-T, 331-T, 504-T
Reinholz, Joe 333-L
Reininger, Hans 585-L
Reinsberg, Otto 580-E
Reiprich, J. 768-L, 372-T, 373-T
Reis, T. 225-M
Reitler, E. J. K. 16-G
Reiter, Stanley F. 272-N
Reitzig, Gerhard 176-F
Remy, Gilbert 854-Q
Remy, M. 251-M
Renaudie, M. 114-G, 238-G
Rendall, J. H. 107-H
Rendleman, Norman C. . . . 2-F, 257-F
Rengstorff, G. W. P. 199-Q
Renman, Gote 479-R
Renouard, Martial . 96-N, 799-Q, 547-S
Renshaw, E. S. 58-E
Renshaw, W. G. 15-R
Renton, C. A. 530-P
Renucci, Georges 710-Q
Repko, Andrew J. 1004-Q
Resen, F. Lawrence 537-L
Reshetov, D. N. 358-G
Ress, W. P. 151-Q
Retty, J. A. 67-B
Reuter, A. 492-L
Reutersward, C. 323-S
Reynolds, C. A. . . . 15-P, 244-P, 292-P
Reynolds, David P. 221-A, 250-A, 280-A
Reynolds, E. E. 899-Q
Reynolds, F. W. 585-P
Reynolds, J. 329-M, 392-M
Reynolds, J. A. 482-S
Reynolds, J. E. 293-N
Reynolds, J. G. 324-S
Reynolds, Myron B. 879-Q
Reynolds, T. W. 370-R
Rezanov, A. I. 262-P
Rheingans, W. J. . 468-R, 169-T, 337-T
Rhines, F. N. 262-E, 256-N, 266-N, 805-Q
Riatti, Luigi 298-R
Ribaud, G. 42-S, 49-S
Ribbe, Alberto Paulo 71-L
Ricard, J. 148-T
Rice, A. C. 371-B
Rice, H. L. 373-R
Rice, L. P. 91-Q
Rice, Owen R. 140-D, 144-D, 242-D, 327-D, 377-D
Rice, Thomas 80-L
Rice, Virgil C. 36-L
Richard, Andre 346-D
Richard, Kurt 141-R
Richards, D. G. 752-Q
Richards, J. H. 534-S
Richards, J. T. 91-F, 374-Q, 399-Q, 602-Q, 554-T, 79-V

Richards, K. 924-Q
Richards, Oscar W. 27-M
Richards, Roy T. 91-L
Richards, T. L. 888-Q
Richardson, B. 72-E
Richardson, D. A. 49-S
Richardson, F. D. . . . 118-C, 6-D, 7-D
. . 21-D, 137-D, 431-P, 498-P, 498-S
Richardson, J. 568-E
Richardson, J. B. 314-A, 541-T
Richardson, James K. 175-B
Richardson, R. E. 269-P
Richins, D. S. 480-E, 520-E
Richmond, Joseph C. . . . . .
. . . . . .501-L, 543-L, 554-L, 638-L
Richter, H. 420-M
Rickett, R. L. . . . 28-N, 207-Q, 608-Q
Ricks, H. E. 833-L
Riddiford, A. C. 1-P, 311-R
Riddihough, M. 288-L
Rideout, Gordon T. 22-G
Rideout, Sheldon P. . . . . .
. . . . . 193-M, 241-M, 430-M
Ridgway, Robert H. 95-A
Riegel, H. I. 340-A
Rienacker, Gunther 444-S
Rieppel, P. J. 418-Q
Rietsch, E. 257-K
Rietveld, J. 40-H
Rietzscher, W. 647-E
Rigby, G. 285-S
Rigby, G. R. 281-D
Rigby, J. 199-F, 209-S
Rightmire, B. G. 1-E
Rigsby, D. L. 691-K
Riley, R. E. 76-N
Riley, R. V. 212-A, 41-B, 197-M
Rinebolt, J. A. 419-Q
Rinck, Emile 122-N
Rinck, F. B. 632-L
Rinehart, John S. . . 233-P, 474-Q, 699-Q
Rinehart, W. G. 357-K
Ringquist, C. L. 221-J
Rinskii, Ia. D. 272-G
Rintelen, J. C., Jr. 78-R
Ripling, E. J. 184-F, 614-Q, 620-Q
Ritter, Franze 377-R
Ritter, J. A. 513-K, 619-K
Rius, A. 274-R
Rivers, H. M. 223-R
Riviere, M. M. 42-S, 49-S
Rivlin, R. S. 275-Q
Roast, Harold J. . . . . .
. . . . . 7-E, 151-E, 249-E, 265-E
Robards, C. F. 4-J
Robba, M. 530-S
Robbins, Kenneth W. 442-R
Roberson, A. H. 41-M, 115-M
Robert, Bruce 620-L
Robert, J. J. 509-G
Roberts, B. W. 77-M
Roberts, C. C. 32-F, 72-F
Roberts, C. S. 236-J
Roberts, George A. 90-H, 99-H, 239-J
Roberts, Howard C. 473-S
Roberts, Ira S. 40-L
Roberts, Irving 604-Q
Roberts, M. H. 969-Q
Roberts, William M. . . . . .
. . . . . 592-P, 456-Q, 970-Q
Roberts, W. J. 866-L
Roberts, W. L. 19-K, 361-K
Robertson, J. M. . 740-Q, 24-T, 145-V
Robertson, T. S. 3-Q
Robertson, W. D. . . . . .
. . . . . 681-L, 779-L, 8-R, 267-R
Robinson, A. 233-D, 175-S
Robinson, E. A. 64-R
Robinson, Ernest L. 775-Q
Robinson, H. A. 190-R
Robinson, Harold 560-K
Robinson, I. R. 419-T
Robinson, J. R. 460-E
Robinson, Keith 308-M, 334-M
Robinson, K. I. 182-J
Robinson, S. A. 296-N
Robinson, Samuel R. 255-E
Rocha, Hans Joachim 301-R
Rockefeller, H. E. 622-K
Rockrohr, Georg 113-B
Rocquet, M. 36-D
Rocquet, P. 264-S
Rodecki, Paul A. 648-K
Roderick, J. W. 934-Q
Roderick, R. L. 213-P
Rodes, Rafael Calvo 224-Q
Rodgers, T. M. 306-L
Roe, Frank C. 194-D
Roe, L. A. 97-B
Roehl, E. J. 56-L
Roehner, T. G. 346-R
Roesch, K. 27-E, 44-E, 269-J
Roff, W. J. 322-K
Rogachevskii, Ia. E. 272-K
Rogatkina, T. N. 176-R
Rogers, B. A. 386-P
Rogers, L. B. 359-P, 346-S
Rogers, R. R. 4-C
Rogers, T. F. 357-P
Rogers, W. T. 352-D
Rogoff, Julian 105-T
Rogowski, Z. W. 326-A
Röhenbeck, A. 38-G
Röhm, Fritz 44-N, 563-Q
Rohner, F. 62-J, 1045-Q
Rohrbach, Christof 343-Q

Rohrback, Gibson H. 367-R
Rohrig, I. A. 50-N
Roig, Jean 545-L, 735-L
Roinet, Charles 481-E
Rolfe, R. T. 109-R
Roll, Albert . . . 653-L, 961-L, 296-R
Roll, Bob 502-S
Roll, F. 223-E
Roll, Kempton H. 15-R, 74-T
Roll, R. 449-E
Rolla, R. 324-L
Rolle, Sidney 48-F
Roller, John S. 8-G, 180-G
Rolt, F. H. 224-S
Romanov, V. V. 154-P
Romans, P. A. 499-S
Romer, J. B. 242-Q
Rominski, R. J. 834-L
Ronay, Bela 525-K
Rooksby, H. P. 720-L
Roop, Wendell P. . 228-Q, 419-Q, 506-Q
Roos, Andre 650-L
Roosbroeck, W. van 221-P
Roper, E. H. 228-G
Roquet, P. 19-M
Rorive-Boute, C. 317-P
Ros, M. 69-Q, 222-Q, 948-Q
Rose, Adolf 28-J, 288-N
Rose, Arnold S. 237-K
Rose, Kenneth 384-G, 3-J,
. . . . 56-J, 131-J, 13-L, 93-L, 195-V
Rosenbaum, J. H. 55-R
Rosenberg, A. J. 439-K, 448-K
Rosenberg, H. M. 22-P, 375-P
Rosenberg, Samuel J. . . 171-M, 216-M
Rosener, Wolfgang 241-R
Rosenholtz, Joseph L. 269-Q
Rosenkranz, W. 309-N
Rosenqvist, Terkel 330-P
Rosenthal, D. 595-Q, 1026-Q
Rosenthal, H. 304-E
Rosenthal, Philip C. 132-E
Rosetta, M. S. 524-S
Rosi, F. D. 61-N, 191-Q
Rosi, R. D. 880-Q
Rosler, Ulrich 154-M, 326-N
Rosner, Kurt 360-D
Ross, Erle F. 392-E
Ross, G. 145-C
Ross, T. K. 516-R
Rossheim, D. B. 86-Q
Rossi-Landi, G. 65-L
Rosskopf, T. 627-K
Rostoker, W. . . . 11-M, 88-M, 90-M,
. . 268-M, 395-M, 54-N, 76-N, 205-P
Rostosky, L. 261-K, 394-K
Roszbach, G. P. 957-Q
Rote, F. B. . . . . .
. . . . 405-G, 5-J, 27-N, 88-Q, 808-Q
Roth, A. 123-C, 296-Q
Roth, Gunther 452-P
Roth, H. W. 576-K
Roth, Louise 319-N
Rothen, Alexandre 110-P
Rotherham, L. 306-N
Rotinian, A. L. 70-C
Rouaud-Perisse, Rene 154-T
Roubik, J. R. 498-G
Rough, F. A. 22-J
Rourard, P. 447-P, 450-P
Roush, C. W. 387-K
Roush, G. A. 78-V
Rousseau, Edmond 301-P, 325-P
Rouze, Stanley R. 108-M
Rove, Olaf N. 90-B
Rowan, Miles J. 21-G
Rowe, Edward A. 424-Q
Rowe, F. 276-E
Rowe, R. H. M. 272-A
Rowe, R. S. 764-Q
Rowell, V. M. 62-E
Rowland, E. S. 238-J, 873-Q
Rowland, P. R. 362-M
Rowley, R. D. 184-L
Royds, R. 124-S, 512-S
Royen, William Van 352-B
Rozenberg, A. M. 243-G
Rozenblat, M. A. 200-P
Rozenfel'd, I. L. 86-R, 278-R
Rozhdestvenskii, L. A. 246-G
Rozier, L. J. 564-L
Rozsa, J. T. 504-S
Rozzhivin, K. V. 242-T
Rubin, B. 94-R
Rubinstein, Martin A. 830-Q
Rubinstein, Marvin 234-L
Rubenstein, Seymour C. 250-L
Rubinchik, Ia. S. 64-C
Ruble, E. J. 692-K
Rübmann, Heinrich 247-S
Rudberg, Erik 458-P
Ruddle, R. W. 569-E
Rudenko, N. S. 155-P
Rudiger, O. 111-H
Rudner, Merritt A. 131-T
Rudolfs, W. 205-A
Rudolph, Walter 437-G,
. 482-G, 15-L, 261-L, 299-L, 374-L,
. . 563-L, 708-L, 854-L, 892-L, 999-L
Rueckemesser, Hans 843-L
Ruedy, R. 993-L
Ruehl, W. F. 253-K
Ruff, W. . . 179-E, 323-L, 326-N, 250-S
Ruffle, T. W. 198-J
Rugare, Anthony S. 473-P
Ruge, Jurgen 578-K
Ruggeri, Sam 880-L
Rühenbeck, A. 164-J, 663-Q

Ruhlman, Jon 78-K
Ruhnke, Donald H. 29-V
Ruka, Roswell 465-R
Rulon, Richard M. 65-P
Rundle, R. E. 65-M, 119-M, 353-M
Runnalls, O. J. C. 164-C
Ruppin, K. 555-K
Rush, A. I. 148-N
Rushbrook, A. E. 25-T
Rusher, Robert L. 138-A
Rushton, S. 62-P, 237-P
Rusinoff, S. E. 142-F
Russell, Allen S. 398-Q
Russell, B. R. 461-M
Russell, J. B. 694-L
Russell, J. D. 430-L
Russell, P. A. 97-V
Russell, Paul L. 60-J
Russell, W. 236-E
Russell, W. D. 345-S
Russenberger, Max 566-Q, 926-Q
Rust, Hans Heinrich 196-P, 578-P, 378-S
Rutherford, J. J. B. 556-T
Rutherford, N. B. 462-E
Rutkoskie, G. V. 478-G
Ruttmann, W. 821-Q
Ruzek, Jan. M. 504-Q
Ruzicka, I. 243-S
Ruzina, E. I. 398-L
Rybchinskii, N. A. 435-K
Ryffel, Henry H. 507-E
Rykalin, N. N. 485-K
Rylander, A. E. 262-F, 304-F, 412-K, 502-K
Rymer, T. B. 269-M

S

Sabaneev, P. F. 597-E
Sachs, George 305-Q, 671-Q
Sachs, K. 161-M
Sackett, W. T., Jr. 55-P, 139-P
Sadamel, S. A. 100-Q
Sadovskii, V. D. 82-N, 191-N, 204-N, 729-Q
Sadun, S. Tor 504-Q
Safonov, A. P. 334-T
Safranek, W. H. 173-L, 392-L
Sage, A. M. 369-A
Sahling, Bernhard 771-K
Saine, V. L. 53-B
Saito, Saburo 367-Q
Saito, Tunezo 101-P
Saker, E. Q. 85-N
Sakhatskii, G. P. 368-K, 714-K
Sakhovskii, M. M. 189-G
Sakurai, Kiichi 340-M
Sakurai, Takemaro 241-P
Salatin, James F. 744-K
Salem, T. M. 307-P
Salewski, Wilhelm 209-A
Salikhov, S. G. 511-P
Salins, Rene de 471-P
Salkovitz, E. I. 85-M, 254-P
Salli, I. V. 222-N
Salt, Charles F. 328-P
Salt, F. W. 110-L, 470-L, 471-L
Salz, Leon 5-G
Salzmann, F. 1011-Q
Samarine, A. M. 344-D, 345-D
Samis, C. S. 65-C
Samoilov, B. N. 137-P
Samoilov, O. Ia. 294-M
Sampson, E. S. 231-F
Samuel, G. A. 782-L
Samuel, R. L. 62-L, 109-L, 219-L, 283-L
Samways, James 167-T
Sanbongi, Koji 470-P
Sancelme, André 75-C
Sanchez, L. T. 352-D
Sanchez, Rafael Cabezudo . . . 63-F
Sandee, J. 251-N
Sandel, Walter J. 21-L
Sandell, W. G. 191-B
Sander, Hans-Rolf . 465-M, 858-Q, 975-Q
Sander, O. A. 588-E
Sanders, Albert M. 278-T
Sanders, Clyde A. 610-E, 630-E
Sanders, J. Lyell, Jr. 122-Q
Sanderson, H. F. 732-L
Sanderson, J. A. 62-F
Sanderson, T. 202-D
Sandford, Folke 483-E
Sandilands, W. A. 214-F
Sands, G. A. 161-V
Sanford, Albert C. 541-S
Santilhano, A. Dias 544-L
Santini, F. 152-F, 92-M
Santos, Lino A. de Lacerda . . . 596-E
Santos, Tharcisio D. de Souza 85-C, 86-C, 87-C
Saratovkin, D. D. 101-N
Sargis, S. G. 366-B
Sariban, A. 216-N
Sarjant, R. J. . . . 50-B, 261-B, 315-T
Sarnowski, R. E. 391-S
Sasaki, Nobuji 201-M, 343-S
Sasena, R. C. 208-L
Sastri, B. N. 133-A, 117-B
Sato, Hiroshi 342-M, 244-N
Satz, L. H. 351-M, 373-Q
Saubestre, Edw. B. 55-L, 116-L
Sauermann, Werner 259-A
Sauerwald, Franz 928-Q
Saulnier, A. 232-N, 1033-Q, 1034-Q
Saunders, C. T. 203-A

Saunders, H. L. 4-D
Saunders, M. S. 871-Q
Saunders, O. A. 49-S
Saunders, W. P. 183-B
Sautereau, M. 238-D
Sautter, Fritz 457-M
Sautter, Werner 44-N
Savage, E. G. 217-R
Savage, F. K. 807-L
Savage, John H. 89-Q
Savage, L. H. W. 5-D, 322-D
Savage, W. F. 104-K
Savintsev, P. A. 101-N
Savioli, F. 82-D
Savits, J. B. 466-E
Savorin, France 574-P
Savorin, Jean 312-P, 409-P, 574-P, 710-Q
Savvina, N. M. 142-Q
Sawai, Zenzaburo 713-K
Sawamura, Hiroshi 464-M
Sawkill, J. 31-N
Sawyer, B. 567-T
Sawyer, D. W. 381-P
Sawyer, John W. 850-L, 979-L
Sawyer, R. B. 210-P
Saxer, E. T. 136-D, 89-S
Saxman, A. B. 768-K
Saxton, R. 76-G, 113-J, 283-Q
Sayers, J. B. 361-E
Sayre, Harrison S. 125-L
Sayre, W. R. 89-S
Sazonov, B. G. 82-N
Scalise, Mario 58-S, 265-S
Scanlan, J. P. 12-H
Scarlott, Charles A. 4-V, 129-V
Scarry, J. L. 133-S
Schaaber, Otto 115-C, 507-P
Schachinger, Liselotte 285-P
Schack, William 120-F
Schäder, S. E. 256-K
Schadlinger, R. 142-C
Schady, A. M. 60-B
Schaefer, L. P. 191-R
Schaefer, Ralph A. 683-L
Schaeffler, A. L. 552-K
Schaetti, N. 30-T, 36-T
Schaeve, D. K. 737-Q
Schäfer, Harald . . 18-C, 37-C, 456-P
Schafer, K. 413-P
Schaffeler, G. 270-J
Schafroth, M. R. 186-P
Schager, Richard J. 13-T, 69-T
Schaller, Gilbert S. 375-R
Scharfhausen, C. 414-G
Scharschu, C. A. 148-D
Schater, R. A. 492-G
Schauff, Erich 248-F
Schaum, J. H. 321-E, 452-M
Schaus, R. A. 697-L
Schchapov, N. P. 353-Q
Schefe, F. K. 110-F
Scheibe, Gunter 360-B
Scheidecker, M. 152-F
Scheil, Erich 153-N, 237-N, 721-Q, 290-R
Scheil, M. A. 80-N
Scheller, Ernest 197-L
Scheller, Walter 114-C
Schellinger, A. Kenneth 251-P
Schemmer, Karl 106-F
Schenk, Max 353-L, 652-L, 237-R
Scherb, Johannes 234-N, 235-N
Schery, K. 813-L
Scheuer, E. 96-V
Scheurer, Werner 452-R
Schevo, B. A. 226-J
Schickner, W. C. 173-L
Schiebel, Roy O., Jr. 84-S
Schiffers, H. 490-P
Schikorr, G. 173-R, 392-R
Schimmel, Fred A. 11-C
Schimz, Karl 178-F, 278-F
Schinn, R. 218-F, 916-Q, 352-S
Schippers, Margarete 311-N
Schlaberg, F. 1087-Q
Schlain, David 507-R
Schlaupitz, H. C. 681-L, 779-L
Schlechten, A. W. 99-B, 75-P
Schlegel, E. S. 296-N
Schleicher, Hans-Walter 815-L
Schleicher, William F. . . . 139-G, 130-J
Schlumpf, R. W. 279-A
Schmahl, N. G. 17-C
Schmalenbach, Ernst 714-Q
Schmedeman, O. C. 95-A
Schmerling, G. . . . 426-L, 441-L, 724-L
Schmidt, A. O. 369-G, 403-G
Schmidt, Walter A. 195-A
Schmiedeke, Max 86-L
Schmitt, Wilhelm 81-D
Schnarrenberger, W. R. 363-R
Schneeman, Justin G. 9-S, 55-S
Schneider, K. 414-T
Schneider, M. 63-C
Schneider, V. 79-Q
Schneider, W. 122-S
Schneider, W. R. 286-R
Schnell, Rudolf 721-Q
Schoefer, E. A. 475-R
Schoellerman, A. 219-K

Schoening, F. R. L. 309-M
Schoffstall, D. G. 9-F, 12-F
Schönlau, W. J. K. 65-K
Schoonover, I. C. 199-T
Schopper, Herwig 39-P, 69-P
Schor, Harold 139-V
Schorsch, C. J. 291-K
Schott, B. C. 114-J
Schrader, Angelica 447-M
Schrader, Hans . . . 42-B, 388-D, 102-J
Schrader, R. 73-S
Schreckenbach, M. 861-Q
Schreiber, A. R. 265-L
Schreiber, Walter 466-Q
Schreiner, N. G. 550-K
Schrier, Elliot 71-C
Schrodeck, E. A. 82-G
Schroder, K. 353-E
Schroeder, Herbert S. 194-D
Schroeder, J. 354-T
Schroeder, J. W. 187-F
Schroeder, W. 56-F
Schroeder, Werner 104-H
Schubert, Konrad 70-M, 101-M, 154-M, 350-Q
Schubert, W. L. 268-L
Schubert, Y. 71-H
Schuch, Adam F. 374-P
Schuchmann, J. A. 250-M
Schuette, E. H. 745-Q
Schufle, J. A. 158-M
Schuhmann, R., Jr. 364-A, 263-B
Schulman, J. H. 237-B
Schulte, Fritz 356-E
Schulte, H. F. 91-G, 254-G
Schultz, Fred O. 78-H
Schultz, H. G. 783-K
Schultz, Norman F. 279-B
Schultz, R. R. 571-L
Schultze, Otto 387-P, 118-T
Schulz, E. H. 460-Q
Schulz, Elisabeth 154-N
Schulz, L. G. 113-P
Schulze, A. 588-P
Schulze, Arthur P. 101-L
Schumacher, J. S. 412-E
Schuman, Leslie N. 84-E
Schumb, W. C. 235-M
Schuster, Ludwig K. 162-F
Schwalbe, Rolf 96-H
Schwalm, D. J. 121-J
Schwartz, A. 286-F
Schwartz, C. M. 275-M, 482-Q
Schwartz, H. A. 90-E
Schwarz, W. 185-S
Schwarz-Bergkampf, E. 155-D
Schwarzmann, L. A. . . . 344-D, 345-D
Schwed, Philip 211-P
Schweir, Fritz 298-Q
Schweisheimer, W. 13-A
Schwerdtfeger, W. J. . . . . 57-R, . . . 73-R, 105-R, 167-R, 505-R, 538-R
Schweyckart, Rene 306-G
Schwope, A. D. . . 15-Q, 284-Q, 1054-Q
Sciaky, Mario 52-K
Scorah, E. 22-S
Scortecci, A. 82-D, 252-E
Scott, E. H. Jr. 497-T
Scott, Eugene W. 168-A
Scott, F. H. 131-F, 160-F, 295-F
Scott, G. D. 123-M, 448-M
Scott, G. G. 518-P
Scott, Howard . . . . . 85-J, ... 6-Q, 53-Q, 394-Q, 672-Q
Scott, Noel W. 442-P
Scott, Reed B. 42-K
Scott, Willard R. 367-R
Scott, William Basil 476-S
Scoville, C. L. 253-P
Scoville, R. W. 252-R
Scribner, Bourdon F. 14-S
Seaborn, L. O. 669-K
Seagrave, Harold J. E. 913-L
Searcy, Alan W. 75-M, 569-P
Seed, M. G. 519-G
Seelmeyer, Gunther 140-R, 302-R
Seelye, Elwyn E. 508-T
Seelye, Howard P. 100-T
Seemann, H. J. . . . 202-N, 96-S, 178-S
Seens, W. B. 266-M, 607-Q
Seferian, D. . . . . .174-K, . . 315-K, 422-K, 527-K, 595-K, 735-K
Sefing, Frederick G. 528-E
Segard, J. 61-V
Segeler, C. George 36-J
Segerstrom, Charles H., Jr., . . 368-B
Seide, Paul 592-P, 457-Q
Seidman, S. M. 307-R
Seiter, J. Gordon 960-L
Seith, W. . . 205-M, 220-N, 252-N, 522-S
Seitz, Frederick 310-M, 354-M, 8-N, 309-Q
Seitz, R. O. 185-K
Sejournet, J. 94-F
Sekiguchi, H. 50-T
Sekiguchi, Kazuhiko . 488-P, 6-R, 445-R
Selikson, Bernard 69-N
Sella, G. J. 209-V
Sellers, J. F. 196-F
Sellman, P. G. 359-M
Selove, W. 47-P
Seltzer, C. S. 40-K, 248-K
Selwood, P. W. 229-P
Sem, M. O. 466-T
Semchyshen, M. 262-Q
Semenova, A. K. 567-Q

Semrau, C. F. 411-E
Sen, M. C. 274-B
Senatoroff, N. K. 91-L
Send, Alfred 59-D
Senderoff, Seymour 758-L
Senett, R. S. 448-M
Senett, William P. 276-P
Senftle, Frank E. 66-B, 365-B
Sengfelder, Georg 61-B
Sengier, Edgar B. 17-B
Senior, T. B. A. 363-M
Sennekamp, Heinrich 144-A
Sentner, R. F. 28-A
Septier, Albert 131-M, 227-M
Sequens, Jiri 197-A
Serdirchenko, D. P. 33-B
Serfass, Earl J. 158-S
Sergeant, P. J. 254-A
Sergy, W. T. 69-D, 130-S
Serin, B. . . 15-P, 239-P, 244-P, 292-P
Serpokrylov, A. I. 243-T
Servi, Italo S. 444-Q, 901-Q
Settle, R. H. 231-L
Seulen, G. W. 19-F
Sewerynski, B. 32-B
Seybolt, Alan U. 80-M, 571-T
Seymour, Raymond B. 575-L, 15-R, 46-R, 91-R
Shabalin, V. I. 492-Q
Shablygin, S. V. 273-K
Shackell, K. K. 697-Q
Shafer, Alfred 263-F
Shaffer, B. W. 46-G, 324-G
Shaffer, George 345-R
Shafrin, Elaine G. 175-P
Shaftan, Kenneth 40-S
Shahani, H. S. 121-A
Shahinian, Paul 867-Q
Shakespeare, William 189-N
Shaler, Amos J. 309-E, 518-E
Shanahan, C. E. A. 158-D, 312-D
Shaner, E. L. 343-A
Shankweiler, F. K. 404-L
Shannon, J. J. 196-D
Sharav, William B. 39-J
Sharifov, K. 510-P
Sharp, H. J. 477-E, 575-E
Sharp, M. 39-N
Sharpe, J. W. 29-M
Sharpnack, E. V. 419-G
Sharvin, Iv. V. 152-P
Shashkov, A. N. 376-K
Shashkov, Iu. M. 326-B
Shaw, F. D. 482-L
Shaw, Geoffrey James 189-N
Shaw, H. L. 447-G, 510-G
Shaw, Milton C. 3-G, 48-G, 183-G, 333-G, 334-G 335-G, 407-G, 408-G, 494-G, 841-Q
Shaw, R. B. 65-D, 884-Q
Shaw, R. E. 84-A, 127-A
Shear, Fred 886-L
Shearon, Will H. 70-T
Shedd, E. S. 371-B
Shedden, J. W. 200-K
Sheehan, G. M. 235-K
Sheehan, J. J. 276-E
Shefelton, W. F. 329-K
Shelleng, R. D. 88-Q
Shelson, William 806-Q
Shelvin, Thomas S. 164-Q
Shephard, E. Colston 55-Q
Shephard, L. A. 884-Q
Shepard, O. C. 197-Q
Shepard, S. W. 14-R
Sherby, O. D. 441-Q, 609-Q, 610-Q, 611-Q
Sherby, Oleg D. 900-Q
Sherman, Arant H. 249-A
Sherman, Charles W. 329-P
Sherrill, W. W. 209-V
Sheshunoff, V. 503-L
Shibuya, Yoshio . . 243-N, 468-P, 210-Q
Shewmon, Paul G. 317-N
Shideler, N. T. 443-L, 598-L
Shield, R. T. 275-Q
Shimizu, Hiroshi 56-P
Shindo, Yotaro 246-E
Shinn, D. A. 906-Q
Shipley, F. M. 551-P
Shipley, Morris S. 54-L, 313-L, 778-L
Shirley, H. T. 112-R, 466-R
Shliamberg, Ia. A. 195-L
Shober, F. R. 284-Q
Shobert, Erle I. 60-H
Shock, D. A. 459-R
Shockey, Lovell 465-E
Shockley, W. 311-M, 354-M, 591-P, 317-Q
Shoemaker, David P. 435-M
Shoenberger, L. R. 872-Q
Shome, S. C. 721-L
Shone, R. M. 175-A
Shooter, K. V. 973-Q
Shore, Margot 143-A
Shore, Sidney 764-Q
Shorshorov, M. Kh. 485-K
Shotton, P. H. 26-E
Shraerman, M. R. 378-K
Shraiber, D. S. 298-M
Shreiner, L. A. 171-G
Shreir, L. L. 175-L, 965-L
Shriver, George L. 696-L
Shrubsall, Arthur E. 137-K
Shrubsall, H. I. 995-L
Shubert, Konrad 406-M
Shubin, E. P. 334-T
Shuldener, Henry L. 406-R

Shull, C. G. 50-P
Shumilova, N. A. 303-R
Shupp, C. W. 794-L
Shur, Ia. S. 162-P, 165-P
Shvetsova, E. M. 407-Q
Shyne, J. C. 75-J
Sibley, Robert 7-G
Sicha, Miroslav 160-S
Sidebottom, O. M. 308-Q, 651-Q
Sidery, A. J. 77-A
Sidlow, R. 182-L
Siebel, E. 174-F, 323-F, 665-Q, 923-Q
Siebel, G. 159-C, 226-E, 168-V
Sieber, Karl 167-F, 283-F
Siebert, W. H. 272-E
Siegel, Sidney 12-N
Sigler, C. R. 5-L, 751-L
Signora, Mario 291-D
Silk, Edmond J. 278-J
Silk, James J. 170-E
Sillars, R. W. 66-H
Sillers, Frederick, Jr. 254-B
Silman, H. 610-L
Silven, E. G. 330-A
Silverman, Louis 982-L, 220-S
Simard, G. L. 178-B
Simmen, E. 168-J
Simmons, A. L. 108-E, 37-N, 159-N, 170-R
Simmons, D. H. 255-P, 376-P
Simmons, L M. 539-P
Simmons, Ted C. 89-G
Simmons, Ward F. . . . 494-Q, 835-Q
Simnad, M. T. 253-B, 230-R
Simon, A. 73-S
Simon, B. 896-L
Simonds, Herbert R. 120-F
Simons, Eric N. 33-V
Simons, W. E. 141-D
Simon-Vermot, A. . . . 122-P, 179-T
Sims, Clarence E. 382-D
Sims, R. B. 33-F, 159-F, 207-F, 266-F, 295-F, 309-F
Sinadskii, S. E. 114-K
Sinclair, G. M. 682-Q
Sines, George 360-Q, 595-Q
Singh, G. 605-E
Singleton, P. C. 197-F
Singleton, Robert C. 50-F
Sink, L. W. 447-K
Sinnott, M. J. 75-J, 871-Q
Sisco, Anneliese Grunhaldt . . 35-B
Sisco, F. T. 310-D
Sisley, J. P. 940-L
Sissener, John 274-E
Sistiaga, Jose Maria 654-K
Sivarajan, S. R. 271-B
Skakov, Iu 49-M
Skeggs, P. 321-S
Skerry, E. W. 439-R, 490-R
Skillings, David N. 258-A, 281-A, 180-B
Skinner, H. A. 676-L, 775-L
Skinner, R. A. 569-E
Skinner, Walter E. 373-B
Skorodzievskii, S. M. . . . 482-K, 468-Q
Skulari, P. 42-M
Skuratov, S. M. 215-J
Slade, Frank H. 231-B
Slade, J. J., Jr. 164-M
Slaughter, Gerald M. 22-K
Slifkin, L. 290-N, 797-Q
Sloane, Perry J. 863-L
Sloman, H. A. 6-D, 8-D, 197-S
Small, Bartlett R. 184-A
Small, Louis 814-Q
Smallman-Tew, R. 85-T, 460-T
Smarko, Joseph S. 507-R
Smart, A. 759-L
Smialowski, M. 188-R
Smirnov, A. A. 158-P
Smirnov, V. E. 358-G
Smirnova, V. I. 259-P
Smit, J. 556-P
Smith, A. D. N. 529-Q
Smith, A. H. 176-N
Smith, A. Q. 134-F, 145-F, 276-F, 363-T, 392-T
Smith, B. O. 286-A, 45-S
Smith, C. L. 131-F, 160-F, 295-F
Smith, Clyde 37-K
Smith, Cyril Stanley 73-A, 35-B, 82-M, 261-M, 283-M, 431-M, 134-N, 440-P, 473-Q
Smith, David B. 332-P
Smith, D. C. 357-K
Smith, D. M. 521-S
Smith, Dudley T. 269-Q
Smith, D. W. 477-Q
Smith, E. A. 1002-Q
Smith, E. M. 602-Q, 736-Q
Smith, F. H. 2-V, 98-V
Smith, F. R. 258-D
Smith, Frank C. 641-Q
Smith, F. S., Jr. 91-G, 254-G
Smith, G. Frederick 143-S
Smith, G. P. 575-Q
Smith, G. V. . . . 265-M, 274-N, 606-Q, 622-Q, 676-Q, 868-Q, 870-Q, 989-Q
Smith, Harry 74-K
Smith, H. H. 185-V
Smith, J. W. 175-L, 965-L
Smith, Julian C. 322-B
Smith, Kenneth M. 37-S, 493-S
Smith, Loren W. 12-R
Smith, Marion L. 351-B

Smith, M. J. 102-D
Smith, P. A. 3-G, 407-G, 408-G
Smith, P. B. 379-P, 532-P
Smith, Peter 214-F
Smith, R. L. 909-Q
Smith, Robert E. 322-G
Smith, R. P. 7-P
Smith, S. Livingston 280-Q, 695-Q
Smith, S. S. 104-K
Smith, Stephen 2-J
Smith, T. D. 237-B
Smith, T. S. 583-P
Smith, V. W. 444-E
Smith, W. A. 130-Q
Smith, W. B. 232-F
Smith, Wm. P. 196-F
Smithells, C. J. 137-V
Smith-Johannsen, Robert . . . 211-K
Smolenskii, G. A. 106-P
Smolka, Bernard 701-K
Smoluchowski, R. . . 4-M, 9-N, 25-N, 38-N, 125-N, 197-N, 231-N, 240-N, . . 249-N, 42-Q, 189-Q, 325-Q, 645-Q
Snavely, C. A. 7-A
Snedden, H. D. 123-B
Snook, H. W. 346-G
Snow, A. I. 65-M, 353-M, 125-P
Snow, Willie J. 6-A
Snyder, Charles W. 182-E
Snyder, C. J. 551-Q
Snyder, Ernest B. 269-D
Snyder, Harold Jack 240-J
Snyder, William A. . 231-E, 23-K, 197-K
Sobantsev, D. Ia. 243-T
Sobol, S. I. 202-P
Soderberg, Gustaf 312-L, 599-L
Soderberg, C. Richard, Jr., . . . 145-S
Soete, W. 123-G, 185-G, 188-K
Sokhor, M. I. 175-M, 177-M
Sokolosky, Walter A. 487-E
Sokolov, A. V. 135-P, 158-P
Sokolovskii, L. O. 276-K
Sollenberger, C. L. 345-B
Solomon, J. L. . . . 178-K, 210-K, 252-K
Solter, R. L. 141-N
Someno, Mayumi 260-J
Somers, R. E. 105-F
Sommer, Franz 275-D
Sommer, William J. 544-S
Sommerville, R. L. 216-A
Sondheimer, E. H. 437-P, 438-P
Songa, Tullio 523-S
Sonnenschein, C. L. 486-G
Sorenson, James 118-J
Sosin, J. 62-C
Sotnikova, V. I. 157-L
Souder, Wilmer 199-T
Souza Santos, Tharcisio D. de 85-C, 86-C, 87-C
Sowter, G. A. V. 54-P
Spare, Gordon T. 1030-Q
Sparks, Morgan 408-P, 462-P
Spath, Don 319-S
Spath, W. 664-Q, 1042-Q
Spawn, O. J. 904-L
Spear, P. 284-G, 419-T
Specht, H. 420-M
Specht, K. 188-A, 288-G, 337-G
Spedden, H. R. 278-B, 76-M
Spedding, F. H. 105-C, 386-P
Speich, G. R. 74-N
Speight, G. E. 317-D
Speirs, J. D. 818-L
Speiser, R. 114-M, 53-S
Speith, Karl Georg 325-D, 350-D, 391-D
Spektor, E. Z. 185-M
Spektor, O. Sh. 227-G
Spencer, C. C. 384-E
Spencer, K. A. 291-R
Spencer, Lester F. . . . . 118-E, 41-F, 200-G, 208-G, 225-G, 269-G, 287-G, 304-G, . . 11-J, 45-J, 207-J, 125-K, 166-K, 199-K, 220-K, 319-K, 336-K, 417-K, ... 644-K, 762-K, 764-K, 13-S, 60-V
Spencer-Timms, E. S. 232-S
Spendlove, M. J. 19-M, 295-M
Sperry, L. B. 100-R
Sperry, P. R. 163-Q
Spescha, M. 348-T
Speth, K. H. 462-K
Spice, S. M. 443-K
Spicer, F. 515-L, 824-L
Spillman, A. D. 1-T
Spindler, B. 490-E
Spinedi, Paolo 243-R
Spire, E. 19-D, 69-E
Spitz, A. W. 15-R
Spitzer, H. 491-P
Spohr, D. A. 52-P
Spooner, R. C. 59-L, 922-L
Sprankle, A. F. 154-G
Spratt, D. A. 465-P
Spretnak, J. W. 114-M, 881-Q
Spring, S. 162-F
Spring, Samuel 215-L
Springer, Harold E. 292-R
Springer, Richard 152-L
Sproule, D. O. 438-S
Sproule, W. H. 355-R
Sproull, R. L. 586-P
Sprowls, Donald O. 366-R
Spruit, C. J. P. 23-R, 330-R

Spurr, R. T. 574-Q, 1002-Q
Spycher, Hans 255-K
Squarcy, C. M. 183-D
Squire, C. 502-P
Squires, G. L. 296-P
Sreekantiah, B. S. 120-A
St. Andre, Joe 464-T
St. Clair, H. W. 19-N, 295-N
St. Clair, Leo J. 425-G, 69-K
St. Vincent, F. 146-D
Staats, Henry N. 134-S
Stabler, G. V. 129-G
Stables, P. 546-Q
Stabrovskii, A. I. 368-L, 495-L
Stadelmaier, Hans 237-N
Stadelmann, W. 259-T
Stadler, J. 581-E
Stahl, Adrian 68-M
Stahleisen, Verlag 275-D
Stähler, Alb. 49-J
Stalhed, John 248-D
Stanbridge, V. E. 604-L
Standerfer, Samuel 562-L
Standifer, L. R. 51-R
Standley, K. J. 377-P
Stanton, Robert B. 25-E, 165-G, 398-G, 596-L
Staples, R. T. 82-J
Starck, B. 943-Q, 992-Q
Stark, B. V. 326-B, 161-N
Starr, John 918-L, 945-L
Stark, K. 360-L
Starr, C. D. 884-Q
Starr, John 305-G, 39-K, 17-L, 44-S, 17-T
Start, H. J. 131-R
Statz, Hermann 537-P
Staub, F. 20-J
Staub, H. H. 144-P
Stauffer, W. 220-Q, 1012-Q, 379-S, 515-S
Stauss, H. E. 95-C, 108-Q
Staveley, L. A. K. 21-N
Stavrolakis, J. A. 35-Q
Stebel, Oskar J. 57-D, 153-F
Stech, Berthold 156-N
Stedman, Gerald Eldridge 31-K
Steele, M. C. 524-P, 550-P, 652-Q
Steeple, H. 248-M
Steer, A. T. 180-L
Stegmaier, W. 951-L
Steidle, Edward 54-B
Steiger, Naftali 360-M
Steigert, F. E. 79-N
Steinbach, Frank G. 560-E
Steinberger, A. W. 1082-Q
Steinbuch, M. L. 1009-Q
Stein Callenfels, G. W. 49-S
Steiner, J. 35-C, 813-L
Steiner, Robert H. 46-R, 91-R
Steinert, Horst 234-N
Steinheider, W. H. 103-B
Steinitz, R. 396-M, 57-N
Steinrath, Heinrich 295-R
Stell, R. J. 377-L
Stelson, P. H. 271-P
Stempft, A. 98-M, 99-M, 152-M
Stender, V. V. 310-T
Stenhouse, James F. 59-B
Stepanova, I. V. 782-K
Stephens, W. W. 110-C
Stephenson, Clement 759-L
Stephenson, John 493-T
Stern, George 81-H
Stern, Harry 199-E, 256-E, 289-E, 476-E
Stern, Milton 501-R, 502-R
Stern, W. 145-Q
Stetsenko, A. I. 514-P
Steven, W. 121-N
Stevens, A. D. 376-S
Stevenson, Francis H. 803-K
Stevenson, Peter Cooper 136-N
Stewart, C. W. 336-E
Stewart, R. G. 424-L
Stewart, W. C. 418-R
Stewart, W. I. 114-S
Stickley, G. W. 668-Q
Stiles, D. O. 212-F
Stiles, J. Barrington 605-L
Stilwell, E. H. 69-J
Stilwell, G. R. 585-P
Stine, V. F. 769-L
Stinson, Karl W. 351-B
Stirling, W. J. 490-S
Stitt, D. D. 341-B
Stocchi, C. 361-D
Stocker, Wm. M., Jr. . . . 20-G, 703-L
Stockman, L. 349-G
Stockus, Robert L. 267-F
Stockwell, Richard E. 122-F
Stoeckly, E. E. 548-K
Stoiukhin, B. P. 303-Q, 723-Q
Stokes, L. G. 283-D
Stone, Charles F. 174-A
Stone, H. E. N. 53-D, 201-D
Stone, Irving . . . 454-E, 326-F, 361-G
Stone, M. D. 86-J
Stookey, Kenneth W. 224-T
Stoop, J. 1082-Q
Storchheim, Samuel 227-F, 524-L, 8-P, 186-V
Stormont, D. H. 7-R
Stout, R. D. 668-K, 750-K, 31-Q, 504-Q, 46-R
Stove, E. R. 149-R
Stowell, Elbridge Z. 457-Q

Strang, C. D. 281-Q, 577-Q
Stranske, I. N. 415-P
Strasser, Federico 73-G,
. . . . . 181-G, 255-G, 400-G, 456-G
Strasser, N. J. 732-L
Stratton, N. C. 531-R
Straub, John C. 9-G, 90-G
Straumanis, M. E. . 40-M, 110-M, 165-M
Strauss, Jerome 221-F
Strauss, Simon D. . . . . .
. . . . . 122-A, 176-A, 215-A, 351-A
Strebinger, R. 238-R
Street, B. G. 50-M, 427-M
Street, R. 379-P, 532-P
Strela, James V. 469-S, 546-S
Strelets, Kh. L. 131-C
Stricklen, R. 211-L
Strieter, F. P. 183-B, 94-Q
Stringer, J. 5-D, 52-D, 200-D
Stromquist, D. M. 329-A
Stroman, J. L. 516-E
Stromquist, D. M. 41-A
Stross, Gertrude 362-S
Stross, William 362-S
Strothman, E. P. 807-L
Strott, Adolph 77-E, 431-E
Stroud, E. G. 317-R
Strough, R. I. 97-P
Strugovshchikov, D. P. 333-D
Struss, R. 374-T
Struthers, J. D. 58-N
Strutz, C. R. 332-K
Stubbs, M. F. 158-M
Stubbs, R. Lewis . . 27-A, 74-B, 242-B
Stuhlmann, W. 214-J
Stulen, Foster B. 689-Q
Sturdy, G. E. 182-R
Stüssi, David 159-T
Styri, Haakon 597-Q
Styrikovich, M. A. 459-M
Subbins, Warren Fenton 48-P
Such, Irwin H. 367-D
Sucksmith, W. 36-N, 129-N
Sudbury, J. D. 459-R
Sudo, Kingo 469-P
Sudrabin, L. P. 127-R, 411-R
Suess, Th. E. 181-D, 299-D
Sugarman, B. 753-Q
Sugg, R. E. 417-S
Suiter, J. W. 174-N, 709-Q
Sulkin, M. A. 981-Q
Sullivan, G. F. 440-E
Sullivan, John D. 204-B, 60-T
Sullivan, John W. W. 424-S
Sully, A. H. 281-M, 207-P, 155-Q
Sultzbach, P. R. 183-E
Sulzer, W. H. 103-E
Summers-Smith, D. 2-M, 235-M, 462-M
Sumpter, C. E. 113-D
Sumsion, H. T. 80-M
Sun, Shiou-Chuan 79-B
Sussman, Sidney 401-R
Sutcliffe, D. A. 357-Q
Suter, H. R. 676-L, 775-L
Sutherland, B. P. 333-A, 203-B
Sutherland, R. L. 1069-Q
Sutiagina, A. A. 496-L
Sutra, Genevieve 83-P, 472-P
Sutter, Pierre 150-T
Sutton, H. 77-A, 105-V
Suzuki, Hideji 977-Q
Suzuki, Hiromu 279-F
Svec, H. J. 519-S
Swain, A. J. 16-E
Swan, D. 122-G
Swanson, C. O. 203-B
Swaren, J. W. 83-V
Swarf, C. I. 373-E
Sweeney, J. A., Jr. 737-Q
Sweet, Ben F. 559-E
Sweet, John W. 65-S, 161-V
Sweet, William R. 891-L
Swenson, R. W. 55-R
Swensson, Edwin A. 196-E
Swift, H. W. 76-F, 480-G
Swikert, M. A. 396-Q, 843-Q
Swinyard, G. 439-E
Sykes, C. . . . 73-N, 172-N, 292-N, 67-Q
. . . . . 375-Q, 528-Q
Sykes, W. S 25-S
Sylvester, George R. 9-B
Sylwestrowicz, W. . . . . .
. . . . . 131-F, 160-F, 295-F
Symon, E. 179-S
Symon, Keith 814-Q
Symonds, H. H. 95-L, 67-R, 77-R
Symonds, P. S. 139-K, 8-Q
Syre, R. 232-N
Szantho, Eugen von 290-B
Szegho, C. S. 34-K, 20-T
Szygalski, Waclaw 537-R

T

Tabin, J. 206-S
Tabor, D. . 161-Q, 490-Q, 581-Q, 1022-Q
Tacvorian, Serge 95-H
Tagunova, T. V. 275-N
Taits, A. Iu. 131-C
Tajima, Sakae . . . 584-L, 919-L, 981-L
Takagi, Riitsu 73-M
Takahashi, Noboru 226-M
Takenaka, Norio 297-G, 456-S
Takeyama, Hidehiko . . . 95-G, 159-L
Takhashi, Shuichiro 895-Q

Talbot, A. M. 383-M
Talbot, H. L. 294-B
Talmage, Robert 194-V
Tammann, G. 328-R
Tanabe, Yasaku 466-P
Tanaka, Sakae. 81-B, 228-B, 108-S, 408-S
Tanamachi, Masao 265-B
Tang, Yoo-Chi 118-M
Tangerman, E. J. 4-G, 53-G, 124-G, 462-G
Tanzer, Karl 223-A
Tapsell, H. J. 694-Q, 898-Q
Tarasenko, D. M. 156-L
Tarasov, Leo P. 22-G, 516-G
Tardif, H. P. 235-Q
Tarr, Allan L. 76-V
Tarring, R. C. 725-L
Tash, J. A. 121-S
Tatarinova, L. I. 104-M
Tate, A. E. L. 160-M, 23-N
Tatham, R. 968-Q
Tatnall, F. G. 26-Q, 206-Q
Tator, Kenneth 15-R
Tatur, Andre 377-E
Taub, J. M. 15-E
Taverner, L. 276-A
Taylor, A. 161-M, 306-M, 325-M, 441-M
Taylor, A. E. 523-P
Taylor, C. A. 145-M
Taylor, C. H. 43-K
Taylor, D. J. 119-D
Taylor, Donald F. 217-G
Taylor, D. W. 92-T
Taylor, E. Wilfred 234-M
Taylor, Frank 425-L, 677-L
Taylor, G. 320-G, 483-G
Taylor, G. O. 63-L
Taylor, H. E. 62-K
Taylor, H. F. 1-E, 309-E, 518-E, 89-Q
Taylor, H. G. 62-K, 148-K, 240-K, 406-K, 770-K
Taylor, Jack Eldon 172-P
Taylor, Jack L. 60-M
Taylor, John 39-S
Taylor, R. D. 927-L
Taylor, R. I. 591-E
Taylor, Robert M. 665-K
Taylor, Stanley 115-T
Taylor, W. E. 319-N
Taylor, W. H. 286-M
Teal, G. K. 462-P
Teanby, P. M. 366-K
Teasdale, Tom S. 502-P
Tebble, R. S. 595-P
Tedds, D. F. B. 260-E, 426-E
Tedman, D. 232-B
Teed, P. L. 83-C, 770-K
. 472-Q, 632-Q, 732-Q, 1068-Q, 209-T
Teel, R. B. 369-R
Teeple, H. O. 41-R, 44-R, 117-R, 188-V
Tegart, W. J. McG. 295-L, 262-M, 573-Q
Teghtsoonian, E. 449-M
Teichner, Stanislas 262-S
Teindl, Josef 161-D, 648-L
Teitel, R. J. 174-M
Telep, George 87-S
Telesnin, R. V. 393-P, 394-P
Temkine, M. I. 344-D
Temple, R. B. F. 359-S
Temple, S. G. 79-J
Templin, R. L. 365-Q, 478-Q
Tendam, D. J. 49-P
Tenenbaum, Michael . . . 115-D, 183-D
Tenhoor, R. E. 136-A
Terol, A. S. 274-R
Terry, J. G. 313-A
Terui, Makoto 120-H
Tesche, Kurt 189-D
Teskey, George W. 134-D
Tesliuk, M. Iu. 410-M
Tesmen, Arthur B. 358-K
Test, L. J. 810-Q
Testero, Giuseppe 291-D
Testro, H. J. 936-L
Teutem, F. van 204-S
Texter, A. J. 88-D
Texter, H. G. 52-S, 505-S
Thafvelin, K. G. 113-H, 484-T
Thalmann, E. H. 462-R
Theimer, O. 336-B, 361-B
Theis, Erich 64-J, 95-J, 172-J, 202-J, 941-Q
Theron, J. J. 369-S
Theuerer, H. C. 58-N, 221-P
Thews, E. R. 71-A, 94-A, 140-C, 358-L, 517-T
Thielemann, R. H. 214-R, 168-T, 215-T, 385-T
Thielers, C. 483-T
Thielsch, Helmut 140-K, 552-K, 730-L, 63-Q, 165-Q, 828-Q. 833-Q, 1083-Q, 372-R, 67-V, 208-V
Thierry, Paul 246-D
Thomas, B. D. 356-B
Thomas, D. 100-J
Thomas, D. G. 21-N
Thomas, Donald E. 316-N
Thomas, George G. 276-B
Thomas, J. G. 479-P
Thomas, Piere-Julien le 645-E
Thomas, R. David 138-K
Thomas, R. J. Jr. 501-K
Thomas, W. R. 468-M
Thompson, A. J. 158-M
Thompson, A. P. 205-V
Thompson, Donald O. 475-Q
Thompson, F. C. . 3-N, 176-N, 1052-Q

Thompson, G. C. 614-L
Thompson, Henry 356-M
Thompson, Howard J. 316-K
Thompson, J. 162-V
Thompson, J. A. 339-G
Thompson, James V. 445-Q
Thompson, John F. 253-A
Thompson, John G. 36-A
Thompson, N. 449-Q
Thompson, R. 74-C
Thomson, A. G. 636-L
Thomson, A. H. 185-E
Thomson, G. P. 39-M
Thomson, R. F. 237-J
Thomson, W. 349-E
Thorley, N. 31-N
Thornhill, R. S. 66-R, 385-R
Thornton, D. P., Jr. 544-R
Thorpe, Merle L. 779-K
Thring, M. W. . . . . 351-D, 370-D, . . 501-Q, 986-Q, 49-S, 291-T, 448-T
Thrishman, L. E. 406-Q
Throssell, W. R. 27-P
Thum, E. E. 278-A
Thürmer, Alfred 105-L, 406-L
Thurnauer, Hans 728-L
Thursten, Allen M. 534-L
Thurston, Albert P. 403-Q
Thurston, R. C. A. 29-Q
Thurston, Robert T. 293-L
Thury, W. 23-M, 160-Q
Thwaites, C. J. 802-Q
Tibbenham, L. J. 325-K
Tice, E. A. 378-R
Tichenor, Robert L. 302-P
Ticknor, L. B. 500-P
Tiedema, T. J. 196-N
Tietz, T. E. 611-Q
Tietze, H. Watson 86-K
Tigerschiold, Magnus 340-D
Tikkanen, Kai 68-N
Tilley, Milton 629-E
Timmerbeil, H. 75-Q
Timmons, G. A. 262-Q
Timms, C. A. J. 473-G
Timofeev, M. M. . . 266-K, 431-K, 186-S
Tindula, Roy W. 436-E, 566-E
Tipler, H. R. 201-D, 13-Q, 151-Q
Tipper, A. 240-S
Tipper, Constance F. 1015-Q
Tipple, P. M. 487-P
Tipton, C. R., Jr. 182-R
Tisdale, N. F., Jr. 144-J
Titchener, Paul F. 239-T
Titzmann, K. 97-M
Todes, O. M. 223-B
Tödt, Fritz . . . . . 549-L, 342-P, . . 30-R, 300-R, 451-R, 481-R, 185-S
Tofaute, Walter 297-R, 46-V
Tokarcik, A. G. 771-Q
Tolansky, S. . . . . 475-L, ... 448-Q, 202-S, 353-S, 434-S
Toman, Karel 146-M
Tomaszczyk, W. 386-Q
Tombe, Felix 411-M
Tombs, N. C. 543-P
Tomizuka, T. 290-N
Tomlinson, J. W. 121-P
Tomlinson, R. 225-R
Tompkins, F. C. . 411-P, 439-P, 535-P
Tompkins, Joel 241-J
Toneman, F. H. 659-Q
Tooley, D. A. 86-T
Tope, N. A. 94-L
Topping, C. E. 98-T, 104-T
Tor, Sadun S. 31-Q
Törnebohm, Hilding 157-S
Torrado y Varela, Manuel . . 67-J, 67-N
Tortosa, Jean 525-P
Tour, Sam 347-L, 376-L
Tourky, A. Riad 477-P
Tournaire, Marcel 74-Q, 799-Q
Tournay, Madeleine 409-S
Tourret, R. 50-Q, 1002-Q
Tower, Walter S. 66-A
Towers, Helen 302-B, 327-B
Towndrow, R. P. 185-D, 279-D
Towner, J. 926-L
Townsend, John W. 42-A
Toye, R. 256-D
Trabraham, George E. 601-K
Travers, R. H. 307-R
Treadwell, Peter 15-C
Treadwell, W. D. . . 15-C, 114-C, 351-S
Treco, R. M. 885-Q
Trego, K. 220-S
Trembicki, Harold 609-L
Tremlett, H. F. 679-K
Trenkler, Herbert 359-D
Trent, E. M. . 64-Q, 485-Q, 576-Q, 696-Q
Trent, R. S. 289-L
Treptow, Karl-Heinz . . . 140-F, 320-F
Treseder, R. S. 495-R
Tret'iakov, F. E. 487-K
Treuting, R. G. 196-Q, 749-Q
Trichon, G. 459-S
Trigg, C. F. 483-R
Trigger, K. J. 404-G, 406-G, 487-G
Trillat, J. J. 163-J, 346-M, 80-R
Trinks, W. 11-F, 47-F, 62-T
Trocki, Thomas 76-P, 247-T
Trombe, Felix 505-P
Trömel, Gerhard 179-D
Trommer, W. 551-E
Troneva, M. Ia. 422-P
Troost, Alex 104-Q, 718-Q

Trost, A. 109-S, 442-S
Trotter, J. 532-Q
Troy, Arnold 219-A
True, O. S. 15-R
Truell, Rohn 213-P, 270-P
Truman, J. E. 466-R
Trumbore, Forrest A. 65-P
Trump, J. G. 212-P, 425-P
Trumpler, I. G. 506-P
Tsobkallo, S. O. 354-Q
Tsou, A. L. 200-M, 301-N
Tsutsumi, Nobuhisa 7-J, 365-M
Tsyb, P. P. 397-L, 398-L
Tucker, A. J. P. 615-K
Tucker, Charles W., Jr. . 142-M, 765-Q
Tucker, J. T., Jr. 332-Q, 776-Q
Tuffly, Bartholomew L. 337-S
Tupholme, C. B. 161-V
Turkalo, Anna M. 537-Q
Turkdogan, E. T. 316-D, 426-M
Turkevich, John 136-N
Turkin, P. S. 472-K
Turnbull, D. 114-N, 142-N, 264-N, 322-N
Turnbull, J. C. 756-K
Turnbull, J. G. M. 150-S
Turner, A. F. 443-P
Turner, Charles A., Jr. 139-J
Turner, Neil H. 296-B
Turner, R. C. 177-L, 660-L
Turnquist, Carl H. 601-K
Turré, G. 31-T
Tuttle, H. C. 300-F, 469-G
Tuxworth, R. H. 187-M
Tverdovskii, I. P. 514-P
Twigg, Harold 891-L
Twigger, T. R. 147-J
Tyack, F. G. 226-T
Tye, R. P. 433-P
Tylecote, R. F. 642-K
Tyler, Richard G. 39-A, 40-A
Tyndall, E. P. T. 311-Q
Tytgat, D. 122-C
Tyvaert, Pierre 78-L, 301-L

U

Udall, W. 18-F
Udin, H. 361-K, 449-K, 457-K, 553-K, 11-P 12-P, 308-P, 350-P, 393-Q, 502-S
Udy, Murray C. 306-A
Ueda, Ryuzo 201-M
Ueda, Shigetomo 811-L
Ueno, Manabu 183-R
Uhl, William C. 104-R, 212-R
Uhleen, Arthur E. 247-A
Uhlig, H. H. 88-P, 355-P, 11-R 54-R, 186-R, 254-R, 280-R, 312-R, 341-R, 400-R, 497-R, 501-R, 502-R
Uhlir, E. 273-S
Uhlmann, W. 504-G
Ulitin, W. N. 283-G
Ulmer, Georges . 424-E, 499-E, 246-J
Ulmer, R. C. 405-R
Umblia, Elmar 9-L
Umstatter, Hans 713-Q
Unckel, H. A. 182-M, 199-N
Underwood, A. F. 344-S
Underwood, E. E. 10-P
Unger, R. W. 355-B
Upmalis, Alberts 262-D
Upson, F. A. 155-R
Upson, Ralph H. 272-Q
Upthegrove, C. 88-Q
Urane, S. G. 233-E
Urazov, G. G. 260-M
Urbain, G. 288-B
Urban, W. J. 165-B
Urbanik, J. S. 224-F
Ushioda, Chikao 120-H
Utley, Elmer C., Jr. 1019-Q
Uytenbogaardt, W. 77-S
Uzan, R. 102-P
Uzhik, G. V. 352-Q, 353-Q, 355-Q, 469-Q, 470-Q, 471-Q

V

Vacek, Alois 128-F
Vacher, H. C. 451-M
Vagramian, A. P. 496-L
Vagtborg, Harold 150-A
Vajda, Stephen 314-D, 323-D
Valeur, J. 922-Q, 289-T
Vambersky, Adolf 85-H
VanBergen 124-E
vanBergen, J. A. 340-K
Vance, E. R. 277-S
VanCrombrugge, R. 188-K
Van de Graafe, R. J. 212-P
Van de Loo, K. J. 260-T
Vanden Berg, R. V. 962-L
Vandenberg, S. R. 185-R
van den Bergh, W. J. 115-J
van den Blink, W. P. 340-K
Vanderbeck, R. W. 419-Q
Vanderpool, Howard 906-L
van de Velde, E. J. C. 227-S
Van Duzer, R. M. 50-N
VanEcho, J. A. 592-Q
vanGinneken, A. J. J. 341-M
Vanick, James S. 39-V, 80-V
Van Impe, J. 122-C
Van Itterbeek, A. 422-L, 500-L
Van Laer, K. J. Blok 286-Q
Van Mourik, J. H. C. 230-S
Van Natten, W. J. 801-K
van Niekerk, J. N. 309-M

VanNieukoop, J. 470-S
van Ooosterhout, H. A. 227-S
Van Order, Dean 271-E
Van Reijen, L. L. 371-M
van Roosbroeck, W. 221-P
Van Rossum, Otto 154-L
Van Rysselberghe, P. 314-P,
. . . . . 315-P, 316-P, 258-R, 276-R
Van Santen, G. W. 957-Q
Van Slyke, W. R. 349-B
Van Swaal, J. H. 367-T
van Teutem, F. 204-S
Van Vlack, Lawrence H. 446-G
Varela, Manuel Torrado y . . . 67-J
Varetto, J. 411-S
Varga, F. 163-E
Varik, N. F. 243-T
Varney, W. R. 382-A
Vasarhelyi, D. 416-Q
Vassamillet, Lawrence 317-M
Vatolin, N. A. 515-P
Vaughan, D. A. 12-M
Vaupel, Otto, ... 282-S
Väyrynen, Hikka 27-R
Veiler, S. Ia. 310-G
Veinik, A. I. 638-E
Veiock, L. H. 405-S
Veksler, A. Z. 135-P
Velde, E. J. C. van de 227-S
Venturello, G. 134-M
Verdeyen, J. 424-T
Verink, E. D., Jr. 15-R, 408-T
Verkin, B. I. 155-P, 163-P
Verlee, P. J. 626-K
Verma, Ajit Ram 196-M, 218-N
Vermot, Simon 122-P
Vernon, E. V. 320-N
Vernon, W. H. J. 48-R,
. . 87-R, 118-R, 255-R, 317-R, 342-R
VerSnyder, F. L. 382-M
Verson, John A. 146-F
Verwilst, Y. 556-Q
Vestergaard, R. 559-Q
Vetter, Klaus J. . . 84-R, 175-R, 240-R
Vevers, H. H. 477-L
V'ial, N. V. 729-Q
Vialle, J. M. 96-F, 192-F, 1032-Q
Victor, Maurice 35-T, 94-T,
. . 205-T, 333-T, 412-T, 503-T, 505-T
Vida, Georges 782-Q
Vidal, Georges 137-Q
Vidmajer, A. 76-H, 103-H
Vidosic, J. P. 767-Q
Vielstich, Wolf 221-N
Viens, G. E. 4-C
Vieweg, Richard 500-T
Vigness, Irwin 282-Q
Vincent, K. C. 191-B, 255-B
Vines, R. G. 295-L
Visvanathan, S. 389-D
Vitovec, F. 221-Q, 277-Q, 564-Q
Vivian, Archibald C. . . . 238-Q, 636-Q
Vivian, C. H. 97-T
Vladimirov, S. I. 59-P
Voce, E. 48-V, 57-V
Vodar, Boris 134-P
Vodonik, J. L. 543-T
Voegeli, R. 366-T
Vogel, F. L., Jr. 193-Q
Vogel, Hermine 700-L
Vogel, Kenneth J. 132-S
Vogel, O. 227-L
Vogel, Rudolf . . .289-M, 291-M, 379-M
Vogels, H. A. 260-K
Vogt, E. 204-M, 388-P
Voice, E. W. . . . . .
. . . . . 75-B, 141-D, 144-D, 315-D
Voigt, P. 632-K
Voishko, V. O. 174-G
Volbrecht, Erich 652-K
Voldrich, C. B. 799-K, 418-Q
Vol'fovskaia, F. S. 477-K
Volkmar, W. H. 658-K
Volkov, D. I. 157-P
Volkov, S. I. 249-G, 276-G
Vollbrecht, Erich 683-K
Vollenbruck, O. 263-K
Vollers, C. 773-K
Vollmacher, Hellmuth 204-F
Vollmer, L. W. 124-R
Volodin, V. S. 115-K, 269-K
vom Ende, Hans 190-P
von Batchelder, F. W. 85-M
Von Burg, E. 516-Q
von Blohn, H. C. 105-F
von Burg, E. 59-K
von der Heide, Friederich . . . 69-L
Von Hambach, E. 51-G, 161-V
Van Hofe, H. 661-K
von Kissling, Conrad 95-F
von Krusenstjern, Arvid 744-L
Von Ludwig, Davidlee .17-E, 18-E, 178-E
von Mässenhausen, Walter . . . 207-M
von Preen, W. 147-E, 212-E
Vonsovskii, S. V. 158-P
Von Volkinburg, Leon 15-R
Vordahl, Milton B. 51-V
Vos, W. de 459-G
Voskuil, Walter H. 83-A
Voss, L. C. 453-E
Vösskohler, H. 78-Q, 662-Q
von Szantho, Eugen 290-B
Votta, Frank A., Jr. 231-Q
Vouga, Claude 142-V
Vozdvizhenskii, G. S. 396-L
Vreeland, T., Jr. 882-Q

W

Waber, J. T. 182-R, 467-R
Wache, X. 253-M, 461-Q
Wachtell, R. L. 220-M
Wade, O. W. 477-R
Wadeline, Coe 271-S
Wagener, Georg 195-J
Wagner, Carl . . . . . 28-C, . . 42-N, 265-N, 247-P, 53-R, 500-R
Wagner, C. H., Jr. 101-T
Wagner, E. 602-E
Wagner, G. H. 88-V
Wagner, Gustav 78-G, 506-G, 39-R
Wagstaff, J. B. 297-D
Wahl, K. 100-M
Wahlin, H. B. 53-N, 141-P
Waight, J. F. 78-J
Wain, H. L. 1076-Q
Wainer, Eugene 89-L, 437-L
Wainwright, R. M. 128-R
Waisman, J. L. 54-J
Waite, M. J. 691-K
Wakefield, Willard W. 283-K
Wakeham, F. H. 42-E, 458-E, 621-E
Wakeman, D. W. 370-A
Walchli, Harold 145-P
Waldrip, H. E. 640-L
Waldron, Howard L. 100-C
Waldron, M. B. 216-R
Waldron, W. D. 551-K, 570-K
Walford, J. G. 383-Q
Walker, C. 254-S
Walker, C. B. 412-M, 90-N, 248-N
Walker, Harold 32-D
Walker, H. J. 104-D
Walker, H. L. 254-N
Walker, P. B. 306-Q
Walker, W. E. 845-Q
Walker, Warren, Jr. . 117-S, 194-S, 211-S
Walkowski, Edward 101-B
Wallace, D. 164-K
Wallace, H. A. 60-G
Wallace, I. L. 92-V
Wallace, John F. 89-Q
Wallace, W. E. 469-M, 43-P, 65-P
Wallace, W. P. . . . . 108-F, ... 486-G, 513-G, 68-J, 127-J
Wallbank, A. W. 479-L, 631-L, 707-L
Wallbaum, H. J. 68-P, 348-Q
Waller, Geoffrey 220-T
Waller, W. D. 425-K
Walpole, R. E. 73-B
Walsh, J. S. 155-K
Walter, Fritz 182-T
Walter, Leo 84-J, 102-S
Walter, Paul 256-M
Walter, Peter 288-N
Walters, B. 53-A
Walthew, R. C. 71-B
Walton, C. S. 28-N
Walton, J. L. 226-D
Walunas, Brone M. 427-T
Wanderer, Edward T. 366-R
Wanders, H. H. 95-A
Wanford, D. W. B. 439-P
Wang, C. C. 20-N
Wang, Hung Li 401-P
Wanklyn, J. N. 23-R, 330-R
Ward, J. O. 71-N
Ward, L. 436-P
Warde, John M. 292-B
Ware, S. D. 298-B
Waring, C. L. . . . 510-S, 511-S, 537-S
Warner, Harold G. 174-T
Warren, B. E. . . . . 77-M, ... 166-M, 214-M, 316-Q, 985-Q
Warren, Donald . . . 67-H, 668-K, 750-K
Warren, Harry V. 170-B
Warren, Henry E. 76-D
Warring, R. H. 68-B, 380-G
Warrington, H. G. 14-Q, 41-V
Warrington, R. 288-E
Wartman, F. S. 59-C
Washburn, Jack 988-Q
Wassermann, Gunter 69-M
Wasserman, R. D. 102-K, 449-K
Watanabe, D. 78-M
Watanabe, Han. 72-T
Watanabe, Jiro 247-N
Watanabe, Masaki 507-K
Watanabe, Tamaki 183-Q
Watanabe, Yoshihiko 97-G
Waterhouse, R. B. 207-P
Waters, B. H. C. 151-C, 167-C
Watkins, Franklin M. . . . 161-R, 522-R
Watkins, H. C. . . 544-K, 704-K, 167-N
Watson, C. G. 2-Q
Watson, Glenn R. 355-R
Watson, John H. L. 324-M
Watson, T. T. 39-D, 156-D
Watt, J. R. 585-Q
Watt, W. 123-H
Watts, H. T. . 31-D, 40-D, 230-D, 295-D
Watts, J. T. 333-K
Waugh, John L. T. 301-M
Waverling, Elmer 551-T
Weast, R. C. 761-L
Weaver, C. W. 949-Q
Weaver, Lamar 83-T
Weaver, P. R. 20-Q
Weavind, R. G. 28-B
Webber, R. T. 17-P, 52-P
Weber, C. E. 117-N

Weber, Elmer 542-R
Weber, I. 296-G
Weber, J. T. 265-R
Weber, R. D. 218-L
Weblus, B. 343-P
Webster, E. W. 212-P
Webster, I. S. 432-T
Weck, R. 244-Q
Weddle, W. A. 20-H
Wedl, Hermann 463-Q
Weekly, C. C. 874-L
Weeks, G. W. 50-G, 77-G, 263-G
Weertman, J. R. 398-P
Wegner, E. 350-L
Weibull, Waloddi 630-Q, 1010-Q
Weibull-Saab, I. 1092-Q
Weichsel, L. 425-T
Weidner, R. 222-E
Weigelt, Horst 372-B
Weil, H. 111-S
Weil, N. A. 613-Q
Weiland, W. F. 62-R
Weilandt, Bernhard 303-D
Weill, Adrienne R. 94-N, 151-N, 201-N, 135-Q
Weill, A. Dudley 73-L
Weill, A. R. 95-M
Wein, Samuel 655-L
Weinberg, F. 299-N
Weinberger, Rolf 594-E
Weinstein, Alexander 379-Q
Weintroub, S. 250-N
Weisbeck, R. 291-G
Weise, Frank E. 317-F
Weisert, E. D. 15-R, 340-R, 399-R, 456-R
Weiskopf, Walter H. 778-Q
Weiss, Norman 329-B
Weiss, R. J. 93-H
Weiss, S. Marguerite 533-T
Weissmann, Sigmund 164-M
Weith, Archie J. 120-F
Welber, Benjamin 497-P
Welch, A. J. E. . . . 118-C, 498-P, 543-P
Welch, J. T. 398-S
Welch, W. P. 773-Q
Weld, H. M. 282-M
Wellinger, K. 19-J, 209-M, 346-Q, 719-Q
Wells, A. A. 458-K
Wells, C. Kenyon 287-R
Wells, Cyril 259-N, 878-Q
Wells, N. J. 7-V
Wells, R. A. 21-S
Welsh, J. 343-R
Welsh, J. H. 697-Q
Welsh, J. Y. 352-R
Welsh, N. C. 645-L
Welsh, R. J. 220-T
Welshman, Hugh, Jr. . . . 167-Q, 132-T
Welty, John W. 666-K
Welz, Stefan 464-Q
Wench, G. W. 180-N
Wenck, F. 182-K
Wendeborn, Helmut 31-B
Wengert, Glenn B. 485-S
Wenk, Paul 974-L
Wenk, S. A. . . . 7-S, 483-S, 487-S, 509-S
Wenninger, Clifford E. 300-E
Wensch, G. W. 22-J, 383-L
Wentworth, Richard P. 1079-Q
Wermuth, J. M. 209-V
Werner, J. K. 834-L
Werner, M. 821-Q
Werner, O. 246-S, 440-S
Werner, Richard 278-Q
Wernick, S. 522-L, 726-L, 935-L, 990-L
Wert, C. A. 45-Q
Wert, Charles 181-N
Werth, Siegfried 99-F
Werwch, Harro 227-D
Wesemann, Friedrich 81-D
Wesley, W. A. 88-C, 56-L
Wessel, Günter 40-P
West, Bartlett 170-F
West, C. L. 219-J, 222-J, 229-J
West, E. G. 276-E, 438-K, 41-V
West, Frank B. 338-B
West, W. W. 243-B
Westbrook, Francis A. 360-T
Westbrook, J. H. . . . 793-L, 247-P, 869-Q
Westendorp, G. 466-K
Westermark, T. 266-P
Westin, M. J. 39-A, 40-A
Westphal, R. W. 104-T
Westphal, W. C. 222-P
Westrum, Edgar F., Jr. 264-P
Westwood, W. 450-S
Wetmore, W. O. 480-E, 520-E
Wetterneck, Norbert von 282-S
Wever, Franz 217-N
Wexler, Aaron 116-P
Weyl, W. A. 25-N
Whatham, E. 199-R
Wheeler, Harold A. 567-P
Wheeler, R. N. 330-L
Wheelon, O. A. 23-G, 81-G, 141-G, 233-G, 66-V
Whibley, Peter 181-K
Whilans, M. E. 162-V
Whitaker, C. H. 876-L
Whitaker, Marjorie 268-R
White, A. E. . . . . 148-N, 171-Q, 240-Q . . 458-Q, 637-Q, 777-Q, 804-Q, 899-Q
White, A. M. 43-D

White, E. P. 300-T, 523-T, 536-T
White, J. S. 571-P
White, Leonard F. 21-F
White, S. 14-L
White, Samuel D. 519-Q
White, Taylor 107-G
White, W. C. 233-P
White, W. F. 28-N
White, W. H. 91-Q
Whitehead, E. 203-S
Whitehead, M. H. 3-L, 786-L
Whitehead, W. O. 608-L
Whiteley, H. A. 58-F
Whiteside, Don W. 788-K
Whitfield, M. G. 503-L
Whitman, J. G. 418-K, 477-Q
Whitmer, V. W. . . 134-C, 83-V, 161-V
Whitney, C. R., Jr. 802-K
Whitney, L. H. 209-Q
Whitney, R. E. 404-L
Whittaker, Alan. . . 74-L, 274-L, 332-L
Whittem, R. N. 100-S
Whitten, J. L. 230-J
Whittenberger, E. J. 262-E
Whittingham, J. A. 177-G, 395-G
Wichmann, A. P. 158-A
Wick, Richard 895-L
Wicke, E. 343-P
Wickert, Kurt 322-P, 142-R
Widrig, S. L. 188-J, 760-Q
Widdowson, J. R. 17-A
Wiederholt, Wilhelm . 19-H, 29-R, 528-S
Wiegand, H. 270-J, 842-L
Wiegandt, M. H. 508-K
Wiehe, A. E. 494-R
Wiehr, Hartmut 322-P
Wienecke, Rudolf 443-S
Wiener, Bernard 291-P
Wiesel, J. B. 343-L
Wiest, Paul 78-G, 460-G
Wilcox, Marion J. 161-R
Wilcox, R. J. 772-Q, 161-V
Wilcox, R. L. 113-A
Wild, F. 910-L
Wild, R. 4-D, 202-D
Wilder, A. B. 161-V
Wildhorn, Sorrel 273-Q
Wiley, A. R. 133-L
Wilhelm, H. A. 519-S
Wilkes, J. F. 306-R
Wilkinson, R. G. 31-V, 41-V
Willard, John R. 194-V
Willey, C. T. 832-L
Willey, J. A. 43-L
Willey, R. A. 3-E, 289-K, 410-K
Willi, Albert, Jr. 89-T, 113-T
Williams, A. F. 497-S, 533-S
Williams, C. G. 583-Q
Williams, A. E. . . . 102-C, 27-G, 90-L
Williams, A. Wyn 343-B
Williams, Betty E. 703-Q
Williams, Clyde 235-D, 97-R, 27-V, 167-V
Williams, D. 504-K
Williams, D. N. 271-M, 533-Q
Williams, E. C. 368-M
Williams, E. M. 152-G
Williams, H. J. 234-P
Williams, H. O. 448-S
Williams, J. 121-H
Williams, J. A. 147-L
Williams, L. H. 133-F
Williams, L. S. 434-Q
Williams, Morgan, L. 910-Q
Williams, Robert C. 318-F
Williams, Trevor I. 111-S
Williams, W. J. 649-E
Williams, W. Lee 83-V
Williams, W. M. 283-M
Williams, W. S. 120-E
Williamson, Donald E. 437-S
Williamson, G. K. 16-M
Williman, A. 513-G
Willing, Willi 472-R
Willis, James B. 889-L
Willis, James L. 184-E
Williston, S. H. 368-B
Willmore, Tracy A. 4-H
Willrich, H. O. 15-K
Willstrop, J. W. W. 456-L
Wilms, G. R. 270-Q
Wilsdorf, Doris Kuhlmann 22-M
Wilsdorf, Heinz 22-M
Wilson, A. 257-F
Wilson, B. 14-L
Wilson, C. 126-V
Wilson, C. E. 224-D
Wilson, D. V. 432-P
Wilson, F. H. 59-M
Wilson, G. R. 314-F
Wilson, H. W. 177-P
Wilson, I. W. 256-A
Wilson, J. K. 214-L
Wilson, J. L. 995-L
Wilson, Lee 76-J
Wilson, Pliny J. 115-J
Wilson, R. 572-Q
Wilson, R. E. 396-S
Wilson, W. B. 98-A
Wilson, W. G. 144-J
Wilson, William, Jr. 40-V
Wilterdink, P. I. 1020-Q
Winans, R. R. 131-R
Winegard, W. C. 468-M, 293-N
Wing, A. B. 403-M
Winkler, C. A. 176-L, 177-L, 178-L, 660-L, 964-L

Winkler, James V. 194-V
Winkler, O. 84-C
Winsor, F. F. 170-Q
Winsor, F. J. 743-K
Winston, A. W. 308-A
Winter, C. 543-Q, 661-Q
Winterton, K. 377-A
Wirshing, Ralph J. 112-L
Wirt, J. Raymond 741-K
Wise, Boyd A., Jr. 236-S, 418-S
Wise, E. M. 182-R
Wiseman, H A. B. 803-Q
Wiseman, W. A. 392-M
Wishart, H. B. 751-Q
Wistreich, J. G. 86-F, 164-F, 211-F, 281-F
Withers, G. 7-D
Withers, J. G. 514-R
Withers, R. M. J. 283-D
Witten, Erich 302-D, 290-M
Wittig, Franz Eberhard . 416-P, 354-S
Wittmoser, A. 146-E
Witzig, W. F. 548-P
Wlodek, T. W. 889-Q
Wochnik, Stanley 411-G
Wogin, R. 318-D
Wohlfeil, Theo. A. 768-K
Woldman, Norman E. 47-S
Wolf, H. 85-Q
Wolf, R. 241-G
Wolf, W. 377-T
Wolfe, K. B. 46-F
Wolfe, K. J. B. 262-G, 284-G, 13-M, 419-T
Wolfensperger, R. E. 227-B
Wolfer, H. R. 302-E
Wolff, Edward L. 67-C
Wolff, H. 66-D, 848-L
Wolff, P. H. W. 933-Q
Wolff, P. M. de 439-S
Wolff, Ursula 352-S
Wollan, E. O. 50-P
Wolten, Gerard M. 8-S
Wolter, K. H. 503-G
Womeldorph, Raymond C. . . . 4-H
Wood, D. S. 882-Q
Wood, E. 400-D, 523-P
Wood, Fred J. 370-G
Wood, Grayson B., Jr. 502-G
Wood, J. E. 595-P
Wood, John A. 80-B
Wood, J. W. 405-R
Wood, P. J. 940-L
Wood, Rawson L. 178-E
Wood, Richard 145-G, 210-G
Wood, R. L. 17-E
Wood, T. J. 389-Q
Wood, W. A. . . . 174-N, 270-Q, 709-Q
Wood, W. P. 5-J
Wooding, W. H. 82-K
Woodland, Everan C. 542-T
Woodrow, J. 483-P
Woods, Gorham 165-L
Woodward, Arthur 912-L
Woodward, D. H. 3-P
Woolf, J. J. 367-K
Woolf, Wallace G. 157-A
Woolley, J. C. 379-P, 532-P
Woolman, J. 149-Q
Woolsey, C. C., Jr. 1026-Q
Wooster, W. A. 224-M, 434-M
Work, Lincoln T. 63-B
Works, G. A. 308-R
Worley, R. W. 552-P
Wormser, Felix Edgar 123-A
Wormwell, F. 450-M, 20-R, 108-R, 226-R
Worner, H. W. 23-C, 55-J, 210-J, 280-M, 285-M, 54-V
Worthing, Helen 511-S
Worthington, J. B. L. 231-L
Worthington, Wayne H. 811-Q
Worwag, Georg 345-P, 347-Q
Wray, P. R. 51-J
Wright, Charles Will 134-A
Wright, Clayton M. 709-L
Wright, E. C. 161-V
Wright, K. A. 425-P
Wright, K. H. 343-E
Wright, K. H. R. 546-P
Wright, O. 179-L, 214-L
Wright, R. F. 22-S
Wright, W. B. 56-S
Wright, W. R. 20-P
Wrobel, S. A. 308-B
Wroughton, D. M. 328-E, 408-E, 495-E, 578-E, 137-N
Wscieklica, Janusz 362-D
Wu, T. 596-Q
Wucher, Jules 573-P
Wulff, John. . 518-E, 293-L, 11-P, 12-P
Wunsch, H. L. 492-S
Wunsch, Walter 334-R
Wusatowski, Zygmunt 26-F, 40-F
Wüst, Otto 788-Q
Wyant, R. A. 170-Q
Wyatt, D. G. 18-S
Wyatt, H. W. 1009-Q
Wyler, E. 82-R
Wylie, R. D. 165-Q
Wyman, Clyde H. 33-D
Wyndham, J. L. P. 69-B
Wynne, Richard C. 432-E
Wynne, W. H. 116-J
Wyon 61-Q

XYZ
Xenis, C. P. 103-T
Ya (Russian names starting with Ya may also be written Ia, and in this volume will be found indexed under the letter I.)
Yakushev, S. P. 117-J
Yale, Merrill F. 789-K
Yamada, Kunio 96-G, 97-G
Yamada, Yoshiaki 929-Q
Yamaguchi, Shigeto. 213-M, 423-M, 488-R
Yamaji, Kenkichi 343-M
Yamamori, Sueo 289-N
Yamamoto, Mikio. 247-N, 99-P
Yamanouchi, Hiroshi 7-F, 259-F, 851-Q
Yanagihara, Tadashi 165-E
Yang, Ching Huan 420-Q
Yao, T. P. . .36-E, 107-E, 425-E, 560-P
Yates, Raymond F, ... 92-A
Yearian, H. J.. . . . . 75-M
Yen, C. S. 656-Q
Yeomans, D. E. 888-Q
Yerkovich, L. A. 670-Q
Ying, C. E. 270-P
Ying, Chung Fu 147-P
Yntema, L. F. 543-T, 37-V, 190-V
Yoch, A. H. 184-G, 194-G, 353-G
Yoda, Minoru 368-D
Yoda, Renpei 614-E
Yokoi, Shin 370-Q
Yokota, Kiyoshi 550-E, 367-M
Yoshisaki, Hiroshi 344-M
Yosim, Samuel 306-P
Young, Frederick. 88-S
Young, J. McHardy 719-K
Young, John 652-Q
Young, R. A. 260-S
Young, R. S. 28-B, 450-G
Yribarren, R. 377-S
Yu (Russian names starting with Yu may also be written Iu, and in this volume will be found indexed under the letter I.)
Zaat, J. H. 183-S
Zabban, Walter 358-A, 379-A, 158-S, 212-S
Zabrs, J. 33-S
Zachariasen, W. H. 116-M, 436-M
Zadra, J. B. 371-B
Zaikova, V. A. 165-P
Zagianskii, A. L. 265-D
Zajac, T. S. 441-R
Zakharova, M, I. 206-N
Zalesinski, E. 63-C
Zaletaeva, R. P. 137-M
Zander, Jason M. 130-L, 399-L, 400-L, 795-L
Zandman, Felix 816-Q
Zapf, H. G. G. 915-Q
Zapffe, C. A. 44-M, 451-Q
Zarach, E. 14-L
Zavaritskii, N. V. 245-P
Zaretskii, E. M. 166-P, 246-R
ZaZinovich, G. Zanini. 531-S
Zeagas, G. J. 91-S
Zeder, James C. 25-A
Zeeb, L. E. 504-S
Zeemen, M. J. . . . 255-Q, 256-Q, 135-S
Zeerleder, A. von. 101-H, 271-J
Zeh, Ray. 500-K, 636-K, 467-T
Zehender, Ernst 356-S
Zeigfeld, Robert L. 95-A
Zemansky, M. W. 272-P, 552-P
Zemzin, V. N. 489-K
Zener, Clarence. . 230-N, 123-P, 321-Q
Zeno, R. S. 17-K
Zentler-Gordon, H. E. . . 149-L, 716-L
Zentner, Robert 141-P
Zentner, Victor 780-L
Zeppelin, H. v. 350-S
Zevada, Michael J. 746-K
Zevin, A. D. 229-K
Zeyen, K. L. 577-K, 661-K
Zhdanov, G. S. 568-Q
Zheldak, M. P. 295-M
Zhukova, N. I. 727-Q
Zieba, Jerzy 48-D
Ziebolz, H. 400-S
Ziegler, Günther 235-N
Ziegler, G. W., Jr. 53-S
Ziegler, N. A. 90-Q
Ziegler, W. T. 463-P
Zielke, Charles H. 324-K
Zika, Z. 243-S
Ziliani, Giuseppe 49-D
Zilova, T. K. 118-Q, 119-Q, 727-Q
Zimin, Iu. P. 243-G
Zimmerli, F. P. . . 191-J, 375-S, 276-T
Zimmerman, J. B. 67-S
Zimmerman, J. E. 358-P
Zimmerman, R. 486-T
Zimmerman, R. E. 181-A
Zirm, Franz 38-D
Zirzow, E. C. 529-E
Zisman, W. A. . . . 34-P, 174-P, 175-P
Zlatin, Norman 205-G, 232-G
Zoja, R. 103-M, 416-M
Zoller, H. 244-S
Zorn, E. 241-G, 661-K
Zotov, T. D. 162-P
Zschintzsch, W. 582-E
Zuckerman, S. 74-B, 242-B
Zuidema, H. H. 262-R
Zuilen, H. v. 459-G
Zurbrügg, E. 126-K, 792-K
Zviagin, B. M. 223-B
Zwart, K. K. 130-M
Zwicker, Ulrich. . . 72-M, 46-N, 203-N
Zwierz, Walter 68-L, 411-L
Zylstra, L. B. 404-G, 406-G

SUBJECT INDEX

Since the annotations in the main section of this book are classified into 19 main sections based primarily upon processes and properties, the emphasis in this index has been placed on materials, products, and applications.

Entries under names of processes and properties usually refer only to general treatments of the subject. Wherever possible, items have been indexed under the name of the material or type of material (usually metals, alloys, or metal forms), or under product name. For the latter, broad designations like "Agricultural equipment" are preferred for main headings. Specific items such as "plows" usually are mentioned only in the subheadings. For example, material on rolling of aluminum alloys appears under "Aluminum alloys, rolling of"; rather than under "Rolling, of aluminum alloys"..

An attempt has been made to make the heads as specific as the source material, but not more so. On the other hand, the various specific aspects of a book or treatise on a broad subject are not indexed separately. In general, subject headings have been chosen to conform with the usage in the "ASM-SLA Metallurgical Literature Classification", published by the American Society for Metals, 1950.

Alloy systems in which one member is predominant in percentage composition are indexed under that member only. For example, magnesium-base alloys containing aluminum and zinc are indexed only under "Magnesium alloys, aluminum-zinc". On the other hand, when one element is not predominant, such as an abstract dealing with a ternary alloy, it is indexed under each of the three elements involved. Alloy steels and alloy cast irons are indexed under the designations "Steels, alloy" and "Cast irons, alloy", respectively, followed by the names of the alloying elements, if necessary. — W. W. Howell

Abrasion, mechanical. See Cleaning, abrasive
Abrasion resistance. See Wear resistance
Abrasion testing. See Wear testing
Abrasive-belt polishing. See Polishing, abrasive-belt
Abrasive-blast cleaning. See Cleaning, abrasive-blast; or Blasting, abrasive
Abrasive blasting. See Blasting, abrasive
Abrasive cleaning. See Cleaning, abrasive
Abrasives,
  for buffing and polishing, 115-L
  for cleaning, blast, 769-L
  coated, 528-L, 711-L, 812-L
  handbook, 426-G
  microstructure of quartzite, 160-L
Abrasive wheels,
  diamond, 212-G
  for grinding, 63-G, 248-G, 522-G
  for grinding — book, 42-G
Acetylene welding. See Welding, acetylene
Acid corrosion. See Corrosion, acid
Adhesion, 95-Q, 578-Q
Adhesive joining. See Joining, adhesive
Adhesives
  deterioration of, 559-K
  joining of aluminum with book, 323-K
  mechanical properties of, 559-K
  for metal-metal bonding, 437-K, 632-K
  synthetic resins, 322-K
Adsorption 278-B, 318-M, 27-P, 58-P, 81-P, 174-P, 175-P, 355-P
Aelotropy. See Elastic properties
Africa,
  iron ores of Sahara Desert, 220-B
Age hardening. See Hardening, age, or Aging
Aging. See also Hardening, age
Aging, 13-N
Agricultural equipment
  aluminum and alloys in, 10-T, 194-T
  coatings, paint, 563-L

Agricultural equipment (cont.)
steels in, 82-Q, 145-T, 240-T
welding, arc, 530-K
welding, resistance, 530-K
Air-conditioning equipment, 133-T, 324-T
Aircraft
aluminum and alloys , 451-E, 249-F, 79-T, 255-T, 498-T
coatings,
paint, 531-L, 787-L
corrosion-preventive, 512-L
joining, adhesive, 688-K
magnesium and alloys in, 451-E, 11-T, 79-T, 442-T, 459-T
materials for 906-Q, 245-T
metallurgy in U.S.S.R., 22-T
stainless steels in, 234-T, 161-V
steels in, 510-T
strength testing of, 306-Q
stresses in, 306-Q, 732-Q
titanium and alloys in, 141-G, 195-G, 318-T, 510-T, 61-V, 114-V, 132-V
welding of, 623-K, 710-K
Aircraft engines. See Engines, internal-combustion; Engines, aircraft; or Engines, jet
Aircraft manufacture,
aluminum beam forming in, 94-K
forging of, 371-A
nondestructive testing of welds in, 65-S
plating in, 212-L
presswork in, 326-F, 361-G
quality control, statistical, 429-S
salvage control in, 324-A
steels for, 1082-Q
surface treatment in, 212-L
titanium in, 43-T, 164-T, 7-V
tooling for, 68-G, 164-G
welding, spot, 157-K, 194-K, 217-K, 519-K
Aircraft materials, 632-Q, 68-T
Aircraft parts,
aluminum paints for, 806-L
blanking dies for, 478-G
brazing of aluminum, 495-K
chromating of fuel tanks, 835-L
chromium plating on, 987-L
coatings,
rubber, 835-L
ceramic, 222-L, 702-L, 749-L
fatigue strength of, 732-Q
finishing of, 19-G, 100-L
forging of alloy steel cylinder, 181-F
forming of, 289-G, 379-G, 393-G, 395-G
heat treatment of, 19-G, 173-J
investment casting of heat-resisting, 497-E
joining, adhesive, 67-K
machining of, 19-G
magnesium in, 117-T, 413-T
Aircraft parts (cont.)
manufacture of — Kaiser Mfg. Co., 19-G
metal bonding, 222-L
plating specifications for, 321-S
press forming of, 19-G
riveting of, 19-G
sand casting of stainless steel, 12-E
stainless steels in, 379-T
strength properties of — book, 590-Q
from titanium sheets, 375-G
welding of, 26-K, 620-K, 222-L
arc, 638-K
flash, 78-K, 186-K
pressure, 761-K
resistance, 442-K, 607-K
spot, 515-K
Aircraft propellors, 144-F, 200-F
Aircraft structures, 10-K, 41-K, 42-K, 2-Q
Aircraft wings, 377-G, 378-G, 222-T, 449-T
Air pollution, 228-A, 236-A, 247-A, 286-A
Albania,
mineral resources of, 292-B
Alcomax. See Iron alloys, aluminum-cobalt-columbium-copper-nickel
Al-Fin process, 665-L
Alkali cleaning. See Cleaning, alkali
Alkali metals, molten, 59-S
Alloy cast irons. See Cast irons, alloy
Alloys
aging of, 86-N
magnetic properties of, 133-N
superlattice type, 468-P
coatings, ceramic, 161-L
conductivity, electrical, 138-P
corrosion, sea-water, 97-R
crystal growth in, 205-N
elasticity modulus vs. structure of binary, 123-Q
handbook of compositions and designations, 233-A
ionic radii of elements in, 202-P
liquid-solid reactions in, 103-N
magnetization in, 219-P
oxidation, high-temperature, 357-R
plastic deformation of, 350-Q, 723-Q
properties of, 7-M, 12-N, 126-P, 138-P
solidification of — book, 134-N
structure vs. heats of formation, 255-M
structure, atomic, 7-M
electronic, 7-M
thermodynamics of — book, 247-P
transformations, order-disorder, 12-N
in watch manufacture, 177-T
Alloy steels. See Steels, alloy; or Stainless steels
Alnico. See Aluminum alloys, cobalt-nickel
Alodine process, 996-L

Alsifer. See Iron alloys, aluminum-silicon
Alternating stresses. See Fatigue testing
Alumina. See also Aluminum and Aluminum ores
in blast furnace slags, 388-D
from clay — hydrochloric acid process, 24-B
determination, spectrographic, 25-S
electric-furnace melting of, 120-C
reduction, electrolytic, 38-C
refining, electrolytic, 120-C
sources of — in Canada, 358-B
Aluminum
adsorption of oxygen on, 79-P
in aircraft, 326-F, 79-T, 255-T
as alloying element, 6-T
analysis
photometric, 19-S
spectrometric, 348-S
anelasticity of, 321-Q
annealing of, 182-J, 259-J, 41-N
anodized — corrosion of, 457-R, 411-T
dyeing of, 796-L
electrical behavior of, 323-L
microstructure of, 742-L
photographic reproduction on, 186-L, 498-L, 867-L
porosity of, 744-L
in structures, 265-T
wear resistance of, 59-L
anodizing of, 63-L, 64-L, 89-L, 113-L, 206-L, 217-L, 243-L, 276-L, 323-L, 408-L, 411-L, 437-L, 489-L, 492-L, 614-L, 652-L, 796-L, 814-L, 919-L, 922-L, 944-L, 981-L
applications of, 180-A, 25-T, 33-T, 56-T, 64-T, 99-T, 102-T, 104-T, 119-T, 120-T, 122-T, 130-T, 138-T, 173-T, 225-T, 250-T, 259-T, 260-T, 285-T, 351-T, 352-T, 383-T, 394-T, 403-T, 411-T, 425-T, 435-T, 105-V, 122-V
in automobiles, 252-R, 212-T, 365-T, 471-T
beta-ray interaction with, 275-P, 370-P
brass plating on, 479-L, 707-L
brass welding to, 480-K
brazing of, 3-K, 261-K, 495-K, 103-T, 300-T
in buildings, 35-T, 244-T, 353-T, 401-T, 402-T, 475-T
in cable sheaths, 246-F, 315-F, 308-T, 499-T, 561-T
cadmium solubility in, 138-N
casting of, 115-C, 123-C, 159-C, 167-C, 6-E, 148-E, 197-E, 221-E, 298-E, 9-H, 440-M
in chemical equipment, 158-T
chemically polished, 742-L
Aluminum (cont.)
chromium-plated, 738-L, 825-L
cleaning of, 217-K, 190-L, 226-L, 257-L, 872-L
alkali, 377-L
chemical, 489-L
mechanical, 489-L
coatings,
anodic, 962-L
ceramic, 991-L
chemical, 140-L, 944-L
chromate, 211-L
decorative, 89-L, 437-L, 796-L, 216-R
dip, 694-L
electrochemical, 140-L
enamel, 276-L
lacquer, 353-L
metallic, 205-L, 962-L
oxide, 573-L
paint, 39-A, 276-L, 373-L, 489-L, 642-L, 768-L
plastic, 318-L
spray, 891-L
vapor-deposited, 389-P
coating on steels, 307-L
compressive strength of columns, 830-Q
conductivity
electrical, 278-P, 105-T, 308-T
thermal, 52-P, 536-P
in contact with Cu, 235-R
copper-clad, 210-L, 426-T, 171-V
copper plating of, 723-L
as copper substitute, 285-T
copper welding to, 480-K
core losses in, 394-P
corrosion of, 166-P, 77-R, 216-R, 246-R, 501-R, 502-R
alcoholic, 15-R
anodic, 18-R
atmospheric, 284-R, 309-R, 384-R
chemical, 314-R
galvanic, 105-T
water, 237-R
corrosion inhibitors for, 485-R
corrosion prevention in, 353-R
corrosion resistance of, 268-R, 535-T
corrosion testing of, 513-R
creep of, 23-N, 61-Q, 423-Q, 444-Q, 805-Q, 900-Q, 1052-Q, 105-T
degreasing, 642-L
density of, 44-P
determination, photometric, 384-S, 385-S
deutron stripping reaction with, 534-P
for dies, 39-T
die casting of, 25-E, 92-E, 136-E, 181-E, 414-E, 415-E, 422-E, 533-E, 575-E, 9-H, 296-Q, 1-V
diffraction, X-ray, 552-Q

Aluminum (cont.)
diffusion in copper, 120-N
diffusion, self, 102-N, 231-N
drawing of, 135-G, 165-G, 480-G, 500-G
economic trends, 48-A, 74-A, 95-A, 106-N, 115-A, 125-A, 221-A, 226-A, 256-A, 257-A
elastic properties of, 198-Q, 548-Q
in electric conductors, 561-K, 584-K, 585-K, 93-T
in electrical equipment, 399-P, 100-T, 103-T, 106-T, 107-T, 156-T, 251-T, 317-T, 360-T, 366-T, 380-T, 381-T, 382-T, 391-T, 464-T
electrodeposition of, 126-L, 380-L, 592-L, 646-L, 679-L
electrodeposition of chromium on, 956-L
electrodeposition on, 276-L
electrode potentials of, 154-P
electroforming, 173-L
electrometallurgy of, 38-C, 69-C, 137-C, 141-C, 142-C
electropolished, 865-L, 411-T
electropolishing, 64-L, 394-L, 645-L, 865-L, 953-L, 411-T
embossing of, 409-T
enameling, porcelain, 5-L, 92-L, 542-T
in engines, 410-L, 457-T, 458-T, 512-T
etching, 45-M, 274-T
expansion, thermal, 83-P, 333-P
extrusion of, 44-F, 89-F, 212-F, 298-F, 108-G, 579-L
fabrication of, 354-A, 489-G, 466-S, 47-T
fatigue strength of, 686-Q, 308-T
fatigue testing of, 229-Q, 688-Q
fatigue testing of — book, 1094-Q
in ferrosilicon — disintegration effects, 1-N
finishing of, 190-L, 264-L, 632-L, 686-L, 772-L, 872-L
in food handling, 116-T, 285-T
forging — extrusion process, 44-F
forming of, 287-G, 377-G, 378-G, 419-G
forming of — book, 524-G
in foundry coreboxes, 296-E
foundry practice, 217-E
fractures of, 444-Q, 699-Q
frictional properties of, 429-Q, 572-Q, 1087-Q
grain growth of, 18-N, 317-N
in gunmetal, 428-Q
hardening of, 9-Q
hardness testing of, 223-Q, 360-Q, 648-Q
heat of combustion of, 42-P
heat of fusion of, 416-P
heat transfer at melting point, 507-P
heat treatment of, 259-J, 94-K, 466-S
Aluminum (cont.)
high-purity,
analysis of, 31-S
anodizing of, 493-L
applications of, 14-V
creep of, 362-Q, 444-Q, 522-Q, 531-Q, 534-Q, 888-Q, 901-Q
fractures of, 444-Q
impact testing of, 1063-Q
plastic deformation of, 322-M, 703-Q
polishing, chemical, 493-L
production of, 82-C, 14-V
properties of, 14-V
recrystallization of, 233-N, 303-N
in roofing, 231-T, 316-T
segregation of impurities in, 454-M
silver solubility in, 306-N
slip of, 288-M, 532-Q
solidification of, 155-N
structure, crystal, 288-M, 901-Q
torsion strength of, 522-Q
historical survey of, 333-A
hydrogen in, 304-N, 1082-Q
indium solubility in, 138-N
international research center for, 222-A
in iron deoxidation, 6-D, 6-T
iron in — determination of, 112-S
joining, adhesive, 298-K
joining to copper, 314-K
light absorption of, 113-P
luminosity of, 233-P
machining of, 171-G, 258-G
magnetic properties of, 150-P, 479-P
markets for, 88-T
mechanical properties of, 246-T, 524-T
melting of, 495-E, 510-E, 578-E
melting furnace for, 516-E
metallizing of forming dies, 75-L
in metallurgical control, 6-T
metallurgy, extractive, 101-C, 122-V
microscopy, electron, 22-M, 423-M
molten, 520-E, 637-E, 560-P, 418-T
molybdenum disulfide adherence to, 142-P
monopolies in — book, 170-A
nickel plating of, 479-L, 636-L, 707-L, 723-L
in nitrogen stabilization, 6-T
nucleation of, 571-E, 251-N
oxidation, high-temperature, 245-R
oxide-coated, 573-L
oxidized, 582-Q
oxygen in — determination of, 168-S
patternmaking for, 609-E
peening, shot, 378-G
penetration into sand molds, 71-E
permanent mold casting, 139-E, 180-E

Aluminum (cont.)
in petroleum-refining equipment, 415-R, 403-T, 408-T
photography on, 89-L, 437-L
physical properties of, 246-T, 524-T
in pig iron — determination of, 450-S
pitting of, 18-R
plastic deformation of, 171-G, 44-N, 9-Q, 121-Q, 270-Q, 552-Q, 709-Q, 1000-Q
plastic properties of, 377-Q
polishing, 190-L, 276-L, 394-L, 670-L, 872-L, 937-L
polygonization of, 23-N
in power-transmission equipment, 58-T, 98-T, 249-T, 285-T
production of, 27-A, 69-C, 123-C, 41-V, 105-V
properties of, 176-Q, 122-V
proton scattering by, 255-P, 269-P
pyrophoric properties of, 455-P
quenching of, 377-G
radiation absorption in, 376-P, 425-P, 426-P
in radiators, 32-T
recovery of, 12-C, 174-N, 305-N
recrystallization of, 251-N, 287-N, 418-M
refining of, 52-C, 137-C
reflectivity, polarized-light, 3-P
removal from brasses, 428-Q
removal from gunmetal, 428-Q
resistivity of, 87-P, 479-P, 570-P
resources of — U.S., 280-A
riveting of, 160-K, 436-K, 103-T
riveting of — book, 328-K
rolling, cold, 247-F
rolling defects — "netting", 152-F
in roofs, 45-T, 121-T, 354-T, 398-T, 444-T, 519-T
shear strength of, 564-Q
in shipbuilding, 404-T, 470-T, 516-T, 518-T
slip of, 9-Q, 121-Q, 203-Q, 313-Q, 887-Q, 990-Q, 1045-Q
soldering of, 261-K, 339-K, 394-K, 510-K, 974-L
solution in deutero — electrolytes, 171-R
solution potentials of, 197-P
solution in sodium hydroxide — kinetics of, 289-P
specifications for, 326-S
spinning of, 197-G
stamping of, 287-G
in steel deoxidation, 6-T
steel welding to — flow process, 703-L
stitching of, 74-K, 297-K
strength - weight ratio for, 981-Q
stress analysis, 771-Q
in structures, 4-T, 16-T, 46-T, 393-T, 563-T

Aluminum (cont.)
structure
atomic, 54-M, 219-M
crystal, 16-M, 156-M, 160-M
deformation, 174-N, 163-Q, 196-Q, 437-Q, 552-Q, 805-Q, 887-Q
as substitute for copper, 100-T, 101-T, 104-T, 106-T
supply situation, 176-A
tensile deformation curves for, 333-Q
tensile strength of, 23-N, 143-Q, 900-Q, 251-T
tin solubility in, 138-N
as tin substitute, 139-T, 285-T
titanium in, 12-V
twinning of, 974-L, 476-M, 251-N
vacuum deposition of, 476-L, 664-L
water-vapor adsorption on, 27-P
welding of, 3-K, 160-K, 215-K, 253-K, 287-K, 304-K, 308-K, 405-K, 436-K, 571-K, 574-K, 607-K
arc, 156-K, 303-K, 329-K, 648-K
argon-arc, 365-K
forge, 132-K, 465-K
gas, 329-K
gas — book, 600-K
gas-shielded arc, 26-K, 446-K, 622-K
helium-arc, 105-K
resistance, 150-K, 607-K
seam, 302-K, 515-K
spot, 194-K, 302-K, 491-K, 515-K, 729-K
structural, 535-T
thermit, 396-K
in window blinds, 405-T
in window construction, 348-T, 473-T
zinc plating on, 28-L, 479-L, 707-L

Aluminum and alloys
annealing of, 81-J, 82-J, 242-J
anodizing of, 455-L, 456-L, 494-L
applications of, 156-A, 260-A, 185-F, 263-R, 359-R, 28-T, 96-T, 136-T, 159-T, 194-T, 195-T, 204-T, 270-T, 498-T, 508-T, 523-T, 536-T
casting of, 520-E, 521-E
in chemical equipment, 44-T, 269-T
chromium plating on, 852-L, 528-S
cladding of, 119-V
coatings
lacquer, 183-L
plastic, 330-L
compositions of, 263-R
copper electrodeposits on, 528-S
corrosion,
chemical, 263-R, 44-T
marine, 388-R
sewage and manure, 439-R
corrosion resistance of, 269-T
creep of, 859-Q, 938-Q
die casting of, 477-E, 123-F, 172-F

Aluminum and alloys (cont.)
drawing of, 420-G
effect on oxidation of lubricating oils, 381-P
etching of, 460-M
electropolishing of, 494-L, 716-L
fabrication of, 101-V
fatigue strength of, 133-Q, 222-Q
in food — processing equipment, 197-T, 257-T
gas content of, 182-S
gating systems for, 521-E, 524-E
grain growth of annealed and rolled, 92-M
grain refinement in, 439-E
grinding, surface, 494-L
hardening, precipitation, 81-J, 242-J
heat treatment of, 271-J
for high temperatures, 119-V
joining, 5-K, 846-L, 864-L
machining of, 228-G, 337-G
machining of — book, 493-G
mechanical properties of, 922-Q, 263-R
metallography of, 316-M
metallurgy, physical, 119-V
microhardness of, 1034-Q
nickel plating on, 528-S
phase diagrams of, 119-V
phosphating of, 83-L
plastic deformation of, 460-M
polishing of, 494-L, 716-L, 37-M, 460-M
radiography, x-ray, 172-M
research in 1951 on, 58-V
in ships, 123-T, 155-T, 203-T, 349-T, 350-T, 363-T, 371-T, 372-T, 373-T, 374-T, 375-T, 392-T
soldering of, 126-K, 290-K, 293-K, 674-K
specification for, 316-S
spinning of, 420-G
as substitutes for ferrous metals, 188-A
in textile machinery, 44-T, 196-T, 311-T, 327-T
wear against clay particles, 183-Q
welding of, 126-K, 384-K, 444-K, 594-K, 655-K
arc, 792-K
argon-arc, 629-K
gas, 792-K
pressure — hot, 18-K

Aluminum alloys,
aging of, 94-V
in aircraft, 212-L, 73-T
analysis,
chemical, 256-S, 362-S, 542-S
spectrographic, 48-S
anodized, 217-R
anodizing of, 59-L, 66-L, 271-L, 587-L, 740-L

Aluminum alloys (cont.)
applications of, 213-E, 38-G, 366-R, 5-T, 44-T, 94-T, 95-T, 122-T, 152-T, 205-T, 206-T, 296-T, 412-T, 488-T, 504-T, 505-T, 523-T
in automobiles, 208-T, 300-T
bend testing of, 960-Q
bonding with, 545-K
brazing of, 70-K, 164-K, 94-V
in buildings, 286-T, 287-T, 316-T, 487-T, 488-T, 489-T, 503-T
in buses, 263-T, 266-T
cadmium-copper, 173-N
casting of, 247-E, 633-E
chromium, 188-N
chromium-copper-magnesium-manganese-nickel-titanium-vanadium, 4-Q
chromium-iron, 190-M
chromium-magnesium-titanium, 128-Q
chromium plating of, 414-L, 434-L
chromium-silicon-zinc, 849-Q
chromium-zinc, 189-M
in civil-engineering equipment, 331-T, 336-T, 553-T
cleaning of, 226-L
coatings for, 93-G, 272-L, 842-L, 504-T
cobalt-copper, 287-M
cobalt-iron-nickel, 168-M
cobalt-nickel, 327-P, 517-P
compression strength of, 457-Q, 803-Q
copper
aging of, 215-J
coatings for, 336-L
density of, 328-M
electrical properties of, 1035-Q
hardening, age, 29-N
hardening, precipitation, 232-N, 282-N
hardness — breaking stress ratio, 169-S
microstructure of, 109-N
precipitation in, 169-N
separation of components in, 116-C
structures, atomic, 329-M
structure, crystal, 328-M
structure, electronic, 18-M
tempering of, 232-N
tensile strength of, 884-Q
welding, gas, 399-K
copper-indium, 173-N
copper-iron, 287-M
copper-magnesium
aging of, 207-N, 932-Q
corrosion resistance, 819-Q, 268-R
corrosion, sea-water, 218-R, 219-R
creep of, 1064-Q
crystallization in, 309-N
deformation from hardness-test indenters, 448-Q

Aluminum alloys (cont.)
copper-magnesium (cont)
diffusion of copper and magnesium in, 96-N
drawing of wires of, 324-F
ductility of, 932-Q
electrodeposited, 96-N
fabrication of, 61-F
hardening, precipitation, 232-N
machining standards for, 251-S
phase diagrams of, 260-M, 819-Q
for printing-plate mounts, 493-T
radiography, semimicro, 20-M
for rivets, 485-T
rolling, cold, 247-F
stress-strain properties of, 932-Q
structure, crystal, 46-M, 327-M
tempering of, 232-N
tensile strength of, 819-Q
welding, argon-arc, 487-K
yield strength of, 819-Q
copper-magnesium-manganese, 17-J, 799-Q, 61-T
copper-magnesium-manganese-zirconium, 799-Q
copper-magnesium-silicon, 232-N
copper-magnesium-zinc, 96-N, 311-N, 37-Q, 932-Q, 268-R
copper-magnesium-zirconium, 799-Q
copper-manganese, 287-M
copper-nickel, 287-M, 333-P, 1064-Q
copper plating on, 414-L
copper-silicon
die casting of, 270-E, 493-Q
corrosion resistance of, 268-R
expansion, thermal, 333-P
mechanical properties of, 493-Q
microstructures of, 160-Q
for permanent-mold castings, 283-T
strength properties of, 160-Q
copper-silicon-zinc, 426-Q
copper-tin, 173-N
copper-zinc, 257-M
corrosion of, 126-V
acid, nitric, fuming, 42-R
atmospheric, 364-T
chemical, 187-R, 364-T
fretting, 1072-Q
tap water, 536-R
corrosion resistance of, 100-R, 333-R, 375-R, 94-V, 187-V
creep of, 172-Q, 364-Q, 516-Q, 609-Q, 610-Q, 611-Q, 757-Q
creep testing of, 78-Q, 660-Q, 1053-Q
crystallation of ternary alloys of — book, 447-M
degassing of, 819-L
in design, 194-V

Aluminum alloys (cont.)
die caster for, 417-E
die casting of, 43-E, 53-E, 139-E, 158-E, 189-E, 399-E
die quenching, 338-G
drilling of — plastic tooling for, 68-G
economic and technical trends, 60-T
elasticity modulus of, 1001-Q, 162-V
electrodeposition on, 314-L
electropolishing of, 461-L
enameling, porcelain, 751-L
etching, 235-L
expansion, thermal, 592-P
extrusion of, 336-L, 943-Q, 992-Q, 126-V
fabrication of, 9-K, 456-T
fatigue strength of, 285-Q, 545-Q, 595-Q, 641-Q, 681-Q, 682-Q, 684-Q, 694-Q, 1068-Q
fatigue testing of, 491-Q, 603-Q, 1019-Q
fluidity of, 107-E, 337-E
fluxing procedure of, 108-C
forging of, 56-F, 65-F, 249-F, 272-F, 325-F, 943-Q, 992-Q
forming of, 68-G
forming of — book, 41-G
hot, 168-G, 364-G
stretch, 1-G, 82-G
foundry practice, 113-E, 213-E, 366-E, 46-Q
fracture of, 1072-Q
frictional properties of, 396-Q
gas removal from, 108-C, 459-E, 622-E
germanium-lithium, 408-M
germanium-sodium, 408-M
gold, 122-M
gold plating on, 414-L
grain refining of, 108-C, 35-E, 191-E
hardening of, 217-G, 62-J
heat treatment of, 77-J, 83-J, 85-J, 116-J, 242-J, 126-V
honing, 204-L
hot-tearing tendency of, 337-E
indium, 187-M
indium-tin, 187-M
casting of, 63-C, 52-E, 187-E, 270-E, 304-E, 480-E, 481-E, 943-Q, 992-Q, 2-V, 94-V
iron, 188-N, 244-N, 271-N
iron-nickel, 47-M, 49-M, 177-N, 136-P, 161-P
iron-phosphorus, 379-M
iron-silicon, 737-L, 23-M, 244-N, 245-N, 484-P
joining, adhesive, 67-K, 322-K, 395-K, 559-K
machinability of, 94-V
machining of, 52-F, 93-G, 217-G, 943-Q, 992-Q, 44-V

Aluminum alloys (cont.)
machining of — book, 40-G
magnesium
aging of, 94-N, 201-N
anodizing of, 649-L, 841-L
coating, lacquer, 841-L
corrosion of, 26-R, 389-R, 390-R
corrosion resistance of, 268-R
density of, 328-M
electrical properties of, 1035-Q
as foundry molds, 16-E
hardness-breaking stress ratio, 169-S
impact testing of, 1063-Q
microhardness of supersaturated, 561-Q
microstructure of, 389-R, 390-R
oxidation, high-temperature, 245-R
pitting of, 410-R
porosity in castings of, 262-E, 374-E
research of I. G. Farbenindustrie, 168-V
structure, crystal, 327-M, 328-M, 206-N
steam reaction with, 16-E
stress corrosion of, 26-R, 351-R, 389-R, 390-R
weldability of, 231-K
welding of, 47-K, 399-K
magnesium-manganese, 1063-Q, 410-R
magnesium-silicon, 819-Q, 914-Q, 277-R
magnesium-zinc, 301-M
aircraft materials, 68-T
analysis, spectrographic, 443-S
corrosion of, 26-R, 389-R, 390-R
corrosion resistance of, 819-Q, 268-R
microstructure of, 76-Q, 389-R, 390-R
phase diagrams of, 819-Q
properties of, 76-Q, 345-Q, 663-Q
shearing strength of, 345-Q
stress corrosion of, 26-R, 389-R, 390-R
tensile strength of, 345-Q, 819-Q
transformations of, 76-Q
yield strength of, 819-Q
manganese, 154-T
corrosion, atmospheric, 277-R
corrosion resistance of, 268-R
pitting of, 410-R
for roofs, 487-T
solidification and structure of, 188-N
welding of sheet, 127-K
manganese-nickel, 308-M
manganese-silicon, 334-M
melting of, 66-E, 388-E, 553-E
microradiography applied to, 148-M
molybdenum, 220-M
molten, 480-E
nickel, 54-M, 300-M
nickel-titanium, 441-M
nickel plating on, 414-L
nondestructive testing, 63-S, 547-S
pickling, 235-L

Aluminum alloys (cont.)
plastic properties of, 441-Q, 875-Q
Poisson's ratio for, 273-Q, 1001-Q
precipitation of fumes from, 200-A
production of, 102-C, 98-V, 101-V
properties of, 213-E, 15-G, 682-K, 39-Q, 46-Q, 232-T, 2-V, 94-V, 126-V
in railroad cars, 232-T, 266-T, 267-T, 285-T, 289-T, 333-T
rare earths, 638-Q
recrystallization of, 660-Q
refining of, 52-C
for rivets, 9-K, 48-K, 59-K, 408-K, 682-K
rolling of, 52-F
sawing of, 306-G
shear strength of, 968-Q
shearing and trimming, 68-G
shell molding of, 128-E, 316-E, 390-E, 405-E, 505-E
in ships, 92-T, 141-T, 258-T, 264-T 338-T, 495-T
shock resistance of, 738-Q
silicon,
applications of, 96-V
calcium determination in, 446-S
corrosion resistance of, 268-R
foundry practice, 59-E
machinability of, 96-V
machining standards for, 251-S
mechanical properties of, 96-V
microstructure of Ca_2Si inclusions in, 446-S
refining of, 61-C, 48-N
sodium for refining of, 14-C
welding, gas, 399-K
silicon-zinc, 849-Q
silver,
aging of, 248-N
annealing of, 320-M
conductivity, electrical, 234-N
creep of, 736-Q
density of, 328-M
diffraction, X-ray, 320-M
elasticity modulus of, 234-N
fatigue of, 702-Q
hardening, age, 234-N, 235-N
hardness of, 234-N
structure, crystal, 328-M, 412-M, 235-N
silver plating on, 414-L
slip in, 122-Q, 971-Q
solidification of, 63-C, 187-E, 337-E
specifications for — book, 367-S
spot testing, 107-S
storage of, 93-G
strength properties of, 272-Q, 590-Q
stress corrosion of, 250-R, 331-R, 358-R
stresses in, 239-Q, 530-Q, 595-Q, 654-Q, 970-Q, 1048-Q

Aluminum alloys (cont.)
stress-strain properties of, 456-Q, 803-Q, 875-Q
in structures, 268-T, 336-T, 364-T, 486-T
in structures — book, 599-K
surface preparation for plating, 611-L
surfacing, hard, 271-L
swaging of, 330-F
tensile strength of, 74-Q, 660-Q, 668-Q, 803-Q, 978-Q, 366-R
tensile testing of, 630-Q, 1059-Q
thorium, 391-M
tin, 399-K, 283-M
tin plating on, 414-L
titanium, 9-C, 107-E, 9-M, 60-M, 90-M, 151-M, 237-M, 188-N
torsion testing of, 1073-Q
transition metals, 286-M
uranium, 391-M
vanadium, 188-N
wear resistance of, 978-Q
weldability of, 219-K, 778-K
welding of, 48-K, 175-K, 533-K
welding of — book, 770-K
acetylene-oxygen, 8-K, 109-K
arc, 393-K
argon-arc, 8-K, 110-K
forge, 132-K
gas, 148-K, 407-K, 469-K
gas-shielded-arc, 216-K, 748-K
spot, 19-K, 219-K, 305-K, 343-K, 361-K, 385-K, 519-K, 567-K, 618-K, 170-Q
resistance, 131-K, 150-K, 664-K
zinc
cathodic protective action of, 189-R
ductility of, 928-Q
fluidity of, 425-E
hardness-breaking stress ratio for, 169-S
lattice structures of, 79-M
microstructure of, 109-N
segregation in, 928-Q
solidification of sand castings, 361-E
welding, gas, 399-K
workability of, 943-Q, 992-Q
yield strength of, 74-Q
zinc plating on, 414-L
Aluminum-alloy beams, 2-Q, 87-Q
Aluminum-alloy bearings, 96-Q, 272-T
Aluminum-alloy castings, 351-E
applications of, 354-E, 451-E, 662-Q, 77-T
bend testing of, 467-Q
coatings for, 336-L, 340-L
creep testing of, 662-Q
defects in, 113-E, 354-E
fatigue strength of, 487-Q
finishing of, 354-E
Aluminum-alloy castings (cont.)
heat treatment of, 487-Q
impregnation of, 469-E, 498-E
mechanical properties of, 349-E
radiography, semimicro, 20-M
standards for, 208-S
stresses, residual, 1051-Q
tensile strength of, 487-Q
tensile testing of, 662-Q
Aluminum-alloy plates, 148-K, 407-K, 494-K, 120-Q
Aluminum-alloy sheets,
Alclad, 221-R
annealing of, 50-G, 77-G, 263-G
corrosion, atmospheric, 273-R, 318-R, 327-R, 329-R, 438-R
fatigue strength of, 417-Q, 526-Q
forming of, 70-F, 50-G, 77-G, 263-G
mechanical properties of, 50-G, 77-G, 263-G
riveted, fatigue strength of, 818-Q
riveting of, 630-K
welding, spot, 643-K
Aluminum-alloy tubing, 183-F, 517-K
Aluminum-alloy welds,
anodizing of, 740-L
bend strength of, 487-K
chromizing of, 740-L
corrosion of, 12-R
fatigue strength of, 487-K
gas-shielded-arc, 494-K, 526-K
hardness of, 47-K
tensile strength of, 47-K, 487-K, 12-R
Aluminum-alumina sintered bodies, 784-Q
Aluminum bars, 123-F, 172-F
Aluminum beams, 94-K, 123-K, 124-K, 453-Q
Aluminum billets, 22-C
Aluminum brasses. See Brass, aluminum
Aluminum bronzes. See Bronzes, aluminum
Aluminum carbide, 61-P
Aluminum castings, 227-E, 232-E, 607-E, 634-E, 725-K, 332-T, 1-V
application of, 282-T, 414-T
brazing of, 706-K
chromium-plated, 322-T
coatings, paint, 250-L
die-cast — book, 199-V
gas absorption in, 22-E
grain refinement of, 571-E
hardness testing of, 110-Q
impregnation of, 206-E
mechanical properties of, 304-E
molding of, 324-E
nondestructive testing, 35-S, 55-S
permanent-mold, 364-E, 283-T
porosity control of, 110-Q

Aluminum castings, (cont.)
production of, 392-E
quality control of, 229-S
sand, 298-E, 361-E, 579-E
sand — book, 199-V
sawing, 13-G, 449-G
stainless-steel thread inserts in, 18-T
twinning in, 471-M
Aluminum cast irons. See Cast irons, alloy, aluminum
Aluminum-clad sheets, 314-T
Aluminum coatings, 252-L, 764-L, 806-L, 300-T
corrosion resistance of, 300-T
dip, 591-L, 703-L, 773-L
for electrodes, steelmaking, 256-D
finishing of, 842-L
reflectivity of, 476-L
sprayed, 85-L, 386-L, 529-L, 603-L, 604-L
on steels, 490-L, 805-L
vacuum-deposited, 536-L, 733-L, 735-L, 442-P
vacuum deposition of, 581-L
zinc, 529-L
Aluminum Company of America, book, 20-A, 167-A, 256-A
Aluminum Co. of Canada, Ltd., 284-A, 296-A
Aluminum containers, 169-G, 84-T
Aluminum couples,
copper, 312-P
Aluminum die castings, 139-E, 507-E
anodizing of, 341-L
applications of, 55-E, 363-E, 433-E, 168-R, 140-T, 167-T, 172-T, 183-T, 300-T, 321-T, 324-T, 332-T, 428-T
coatings, paint, 509-L
finishing of, 401-L
impregnation of, 206-E
process variables vs. properties, 414-E, 415-E
radiographic structure vs. tensile strength, 414-E, 415-E
Aluminum electrodeposits, 160-L, 630-L
Aluminum films, 425-M
Aluminum foil
applications of, 481-L, 14-T, 42-T, 127-T, 319-T, 328-T
corrosion resistance of, 555-T
in decals, 433-T
fabrication of, 42-T
grain growth during recrystallization of 190-N
as packaging material, 12-T, 63-T, 465-T, 555-T
printing, offset, 14-T, 325-T
properties of, 555-T
radiation absorption by, 407-P
Aluminum foil, (cont.)
recrystallization of, 190-N
strength properties of, 42-T
in vehicular protection, 198-T, 200-T
Aluminum forgings, 495-S
Aluminum industry, 219-A, 250-A, 255-A, 12-C, 85-V
Aluminum Company of America, 20-A
in Canada, 284-A, 296-A
in France, 336-A
in Germany, 376-A
government regulations — U.S. 202-A
in India, 367-A
in Italy, 289-B
Kaiser Aluminum & Chemical Corp., New Orleans, 15-A
productivity — Great Britian, 203-A
in Yugoslavia, 146-A
in U. S., 338-A
Aluminum ingots, 302-A
Aluminum nitride, 141-N
Aluminum ores
chlorination of, 161-C
concentration of, 154-B
desilication of, 20-B
electrometallurgy of, 33-C
iron, 94-B
low-grade, 20-B
reduction of, 318-A, 113-C
refining of, 155-C
resources of, 221-A, 152-B, 298-B, 341-B, 41-V
separation of iron from, 162-C
smelting of, 82-C, 123-C
Aluminum oxide coatings, 3-M
Aluminum-paint coatings, 182-L, 197-L, 481-L
Aluminum pastes — book, 163-T
Aluminum phosphide system, aluminum-iron-iron phosphide, 379-M
Aluminum-plastic bonding, 357-T
Aluminum plates, 111-L, 521-Q
Aluminum plating, 511-L, 630-L, 631-L, 723-L
Aluminum plating baths, 387-L, 542-L, 661-L, 750-L
Aluminum powders,
applications of, 74-H, 82-H, 514-T
book, 163-T
in coatings, 74-H, 82-H
combustion, atmospheric, 471-P
flame spectrum — atmospheric, 471-P
production of, 2-H, 28-H, 69-H, 74-H, 82-H
properties of, 2-H, 28-H, 69-H, 74-H, 82-H, 108-H
Aluminum-powder compacts, 2-H, 28-H, 69-H

Aluminum-powder products,
applications of, 101-H
copper, 48-H
diffusion of metals in, 220-N
high-temperature properties of, 100-H, 125-H
mechanical properties of, 100-H, 101-H, 108-H
molybdenum, 220-M
oxidation resistance of, 100-H
physical properties of, 108-H
production of, 49-H, 100-H, 101-H
properties of, 19-H
Aluminum rods, 173-F
Aluminum scrap, 35-A, 52-C, 69-C, 98-V, 105-V
Aluminum sheets
Alclad, 440-T
applications of, 240-G, 472-G, 474-T
bending of, 413-G
in buildings, 378-T, 395-T, 417-T, 476-T
clad, 407-T
conservation of, 12-G
drawing, deep, 413-G
expanded-metal, 230-T
fabrication of parts from, 257-G
forming of, 413-G, 443-G, 397-S
grinding, abrasive, 434-G
peening, shot, 89-G
plastic deformation of, 348-Q
polishing, 472-G
primers for, 988-L
punching, hot, 226-G
riveting of, 409-K, 404-T
rolling of, 209-F, 233-F
stitching of, 43-K, 628-K
structures, rolling, 139-Q
water staining, prevention, 96-R, 122-R
welding, spot, 568-K, 797-K
Aluminum single crystals,
creep in, 284-Q
diffraction, X-ray, 421-M, 432-M
fatigue, thermal, 567-Q
grain boundary energies in, 591-P
hardening, work, 450-Q, 465-Q
hardness, micro-, 407-Q
magnesium, 138-Q
plastic deformation of, 377-M, 563-Q, 567-Q
recrystallization of, 140-N
strength properties of, 563-Q
structures of, 140-N
structures, deformation, 377-M, 139-Q, 440-Q, 567-Q
Aluminum-steel composites, 703-L
Aluminum steels. See Steels, alloy, aluminum
Aluminum-steel wires, 33-T
Aluminum strip
anodizing, 841-L, 900-L
coating of, 96-C, 841-L
casting of, 96-C
presswork on, 218-G
rolling of, 96-C, 123-F, 172-F
welding, projection, 218-G
Aluminum tanks, 37-K
Aluminum tubing, 349-G, 366-R
application of, 329-F, 10-T, 228-T, 455-T
coatings, plastic, 499-T
corrosion, water, 383-R, 421-R
corrosion resistance of, 421-R, 228-T
extrusion of, 143-F, 170-F, 183-F
fabrication of, 28-T
mechanical properties of, 228-T
sinking of, 329-F
swaging of, 315-F, 329-F
wall thickness as function of load, 966-Q
welding of, 49-K, 647-K
Aluminum welds,
brass, 480-K
copper, 480-K
corrosion of, 655-K, 421-R
corrosion resistance of, 690-K
forge, 465-K
nondestructive testing of, 65-S
strength properties of, 126-K, 655-K
Aluminum wires,
applications of, 246-T, 309-T, 455-T, 472-T
drawing of, 224-F, 597-P
electrical properties of, 398-Q
oxide film on, 628-L
plastic deformation of, 795-Q, 1067-Q
resistivity of, 597-P
structure, recrystallization, 31-N
tempering of insulated conductors, 241-J
tensile strength of, 398-Q, 262-T
welding of, 690-K
American Electroplaters' Society, 19-L
American Society for Metals, 1-A
Analysis, 35-B, 277-M, 364-P, 60-S, 86-S, 105-S, 111-S, 197-S, 249-S, 439-S, 484-S
fluorescent tracer agents in, 90-S
pile-activation process, 31-S
spectrographic, 85-S, 118-S, 166-S, 210-S, 237-S, 242-S, 260-S, 263-S, 390-S, 453-S, 510-S, 537-S
Anchors, 126-F
Annealing, 139-J, 167-J, 164-M
Annealing furnaces, 55-F, 10-J, 26-J, 76-J, 89-J, 101-J, 128-J, 196-J
Anodes, 385-P
Anodizing, 113-L, 284-L, 595-L, 856-L, 898-L

Antiferromagnetism. See Paramagnetism.
Antifouling coatings. See Coatings, antifouling.
Antifriction metals. See Bearing metals
Antimony,
aluminum determination in, 385-S
applications of, 174-V
coatings, vapor-deposited, 319-L, 389-P
conductivity, electrical, 466-P
contact melting with lead, 101-N
economic trends, 95-A, 105-A, 226-A, 174-V
electrode potential of, 477-P
magnetic properties of, 150-P
metallurgy, extractive, 174-V
microscopy, polarized-light, 391-M
oxidation, chemical, 477-P
pickling baths for, 972-L
in pig iron — determination of, 450-S
in South Africa, 312-A
structure, crystal, 222-M
in tin — determination, photometric, 416-S
viscosity of, 153-P
Antimony alloys,
cadmium, 286-P
chromium, 125-P
copper, 206-M
iron - phosphorus, 289-M
lead - tin, 154-N
lithium, 30-T
manganese, 377-P
manganese - nickel, 104-P
thallium - tin, 154-N
Antimony electrodeposits,
copper, 206-M
Antimony ores,
copper-lead-tin, 76-C
flotation of, 290-B, 291-B, 174-V
Antimony plating, 447-L
copper, 206-M
tin, 478-L
Antimony single crystals, 419-M
Arc cutting, 294-G, 442-G, 589-K
Arc welds. See Welds, arc
Arcair process, 101-G, 102-G, 116-G
Archaeology, 282-A
Argon-arc welding. See Welding, argon-arc
Armco iron. See Iron, Armco
Armor and ordnance. See also Military equipment
artillery shell production, 191-T
cartridge-case research at Frankford Arsenal, 293-A
coatings for, 140-L, 209-L
forging, hot, 47-F
hardening, quench, 263-J
Armor and ordnance (cont.)
heat treatment of armor plate, 126-J
iron powders in, 342-T
manufacture of bazooka rockets, 67-G
materials for, 65-T
Armour Research Foundation, 4-E
Arsenic, 95-A, 222-M, 144-P, 416-S, 450-S
Arsenic alloys,
copper, 108-P, 529-Q
indium, 386-M
nickel, 105-M
Asia,
iron-ore resources of Eastern part, 307-B
Atlantic Steel Co , 174-A
Atmospheric corrosion. See Corrosion, atmospheric
Atomic energy, 63-A, 305-A, 322-A, 397-T, 399-T, 571-T
Atomic structures. See Structures, atomic
Atomization, cathodic. See Sputtering, cathodic
Austenite, 36-N, 129-N
Australia,
iron-ore resources of, 272-A
Austria,
mineral resources of Eastern Zone, 292-B
steel industry of Eastern Zone, 292-B
Autofrettage process. See Stress relief
Automobiles,
aluminum and alloys in, 256-T, 471-T, 523-T, 536-T
finishes for, 112-L
magnesium and alloys in, 438-T, 441-T, 471-T
research on, 547-T
steels in, 150-T, 369-T
strain gages in manufacture of, 175-Q
welding in, 391-K
Automobile bodies
aluminum and alloys in, 240-G, 208-T, 456-T
brazing in, 205-K
casting of, 481-E
coatings for, 672-K, 343-L, 374-L, 817-L
fatigue measurements in, 387-Q
finishing of, 691-L
phosphating of, 818-L
presswork in manufacture of, 206-K
rolling of steel sheets for, 250-F, 274-F
solders for, 160-V
stress measurements in, 387-Q
surface preparation for painting, 818-L
welding of, 11-A, 205-K, 672-K
welding of — book, 768-K

Automobile bodies (cont.)
welding (cont.)
arc, 511-G, 330-K, 783-K
spot, 511-G, 330-K, 616-K
Automobile engines. See Engines, automobile; or Engines, internal combustion
Automobile parts
aluminum and alloys in, 77-T, 173-T, 183-T, 212-T, 300-T, 365-T, 386-T, 414-T, 440-T
casting of gray and while iron for, 116-E
coating, 233-L, 375-L, 619-L
copper-clad steel radiators, 212-T
copper radiators, 173-T
corrosion prevention of, 522-R
drawing of, 252-F, 507-G
electrodeposition on, 381-L, 505-L, 510-L, 659-L
fatigue testing of, 826-Q
ferrous textured metals for, 128-T
finishing of, 431-L, 512-L, 830-L
forging of, 252-F, 288-F, 289-F, 292-F, 300-F, 316-F, 256-J
forming of, 430-G
fractures of crankshafts, 863-Q
gaging in production of, 377-S
hardening, case, 52-J
heat treatment of alloy steel, 35-J, 90-J
iron castings for, 414-T
magnesium in, 141-V
mechanical properties of crankshafts, 433-G
nonferrous textured metals for, 128-T
peening, shot — of crankshafts, 433-G
press forming in, 121-G
quality control of stampings, 424-S
radiator materials — substitute, 252-R
shell molding of, 387-E
soldering of radiators, 11-A
steels for, 469-T
strength testing of, 864-Q
welding of, 430-G, 25-K, 443-K, 460-K, 863-Q
Autoradiography. See Radiography, auto

Babbit metals. See Tin alloys; or Bearing alloys
Barium,
applications of, 122-V
metallurgy, extractive, 122-V
properties of, 217-P, 122-V
Barium ores, 256-B
Barrel finishing, See Tumbling
Bars, concrete-reinforcing, 7-Q
Basalt, 119-B

Bauschinger effect, 25-P, 154-Q, 527-Q, 635-Q, 892-Q. See also Plastic Properties.
Bauxite. See Aluminum ores
Bearings,
aluminum alloys in, 272-T
ball,
fabrication of, 451-T
gaging in production of, 377-S
heat treatment of, 451-T
inspection of, 451-T
materials for, 98-G
steels for, 451-T
superfinishing of, 97-G
Beilby-layer formation on, 574-Q
bronze, lead,
inspection of, 273-S
casting of, 179-L
corrosion inhibitors for, 416-R
elasticity modulus of, 218-Q
fluid-piston type, 468-T
machining of, 158-G
manufacture of, 137-T
metal transfer during slip, 34-Q
nondestructive testing of, 157-S
plating of, 179-L
pouring of, 558-E
requirements for, 161-T
roller, 787-Q
self-lubricating, 484-T
sintered, 45-H
sleeve, design of, 69-T
steels, chromium, for, 491-T
surface changes on sliding, 574-Q
swaged housing for, 330-F
wear resistance, 97-Q
Bearing alloys, 728-Q
Bearing metals, 289-L, 79-Q, 497-T
aluminum alloys in, 267-Q
corrosion, lubricant, 262-R
corrosion of, 62-R, 514-R
corrosion resistance of, 426-R, 69-T, 497-T
for engines, internal-combustion, 13-T
fatigue strength of, 497-T
frictional properties of, 446-Q
mechanical properties of, 69-T
plastic-impregnated, 580-Q
for railroad cars, 272-T
for roller-bearing cages, 843-Q
sintered iron, 104-H
testing methods for, 71-T
wear of, 514-R
wear resistance of, 292-Q, 446-Q
Bearing properties. See Frictional properties
Bend testing, 337-Q, 823-Q
Bending
acetylene-oxygen torch heating for, 59-G

Bending (cont.)
of anisotropic plates, 521-Q
deformation in, 323-F
equipment and procedures, 10-G
heating, flame, for, 388-G
roll design for, 70-G
in trenching-equipment fabrication, 437-G
Beryllium, 105-V
applications of, 122-V
in atomic-energy program, 571-T
cohesive energy of, 24-P
compressibility of, 478-P
corrosion resistance to gallium, 549-T
economic trends, 95-A, 226-A
elasticity modulus of, 879-Q
fabrication of, 571-T
foundry practice, 571-T
powder metallurgy of, 571-T
properties of, 396-Q, 122-V, 201-V
machining of, 91-G, 254-G
metallurgy, extractive, 122-V
microscopy, polarized-light, 391-M
in nuclear reactors, 134-T
Poisson's ratio of, 879-Q
reflectivity, polarized-light, 3-P
shear modulus of, 879-Q
slip in single crystals of, 194-Q
structure, crystal, 199-M, 478-P
thermodynamic properties of, 217-P, 478-P
twinning of, 476-M, 194-Q
welding of, 571-T
Beryllium and alloys, 172-V, 184-V
Beryllium alloys
cobalt, 134-M
titanium, 119-M
Beryllium carbide, 50-H
Beryllium copper. See Copper alloys, beryllium
Beryllium nitride, 195-B
Beryllium ores
concentration of, 201-V
resources of — South Africa, 341-B
Bessemer converters, 309-B, 327-B, 164-D, 299-D, 385-D, 346-D
Bessemer process, 30-D, 179-D, 378-D, 19-M
basic, 186-D, 187-D, 188-D, 289-D, 350-D, 921-Q
blowing loss from basic converters, 38-D
combined with cupola and electric steelmaking, 238-D
dust in, 290-A, 262-D
economics of, 143-D, 166-D, 203-D
history of, 66-D
low nitrogen steels from, 391-D
oxygen in, 42-D, 71-D, 85-D, 149-D, 150-D, 151-D, 236-D, 240-D, 352-D, 359-D, 360-D
Bessemer process (cont.)
oxygen refining of melts, 247-D
spectrographic control of, 383-D
temperatures in, 549-S
Beverage processing equipment, 235-T, 507-T
Bicycles, 89-K, 427-K
Biographies
Grum-Grzhimailo, 234-A
Mushet, David and Robert F., 323-A
Bismuth,
in aluminum alloys, 15-G
as coolant for nuclear reactors, 134-T
conductivity, thermal, 437-P
contact melting of, 101-N
determination, spectrographic, 15-S
economic trends, 95-A
electrode potential of, 280-P, 409-P
Hall effect in, 67-P
magnetic properties, low-temperature, 17-P
microscopy, polarized-light, 391-M
molten, 185-M
photon absorption cross sections in, 593-P
in pig iron — determination of, 450-S
proton-scattering cross section, 269-P
reflectivity of polarized light from, 483-P
solidification shrinkage of, 377-E
spectra, arc, 341-S
structure, fractographic, 44-M
surface tension at melting point, 259-P
viscosity of, 153-P
Bismuth and alloys, 318-S
Bismuth alloys
cadmium-tin, 422-M, 581-P
copper, 206-M
lead, 1-K, 434-P
magnesium-potassium, 457-M
manganese, 464-P
tin, 116-C, 165-E
Bismuth coatings, 31-P
Bismuth electrodeposits,
copper, 206-M
on gold, 847-L
on platinum, 847-L
Bismuth plating, copper, 206-M
Bismuth single crystals, 250-D, 419-M, 247-N
Bismuth wires, 282-P
Blanking and punching, 32-G, 317-G, 437-G, 438-G, 478-G
Blast cleaning. See Blasting; Cleaning, blast
Blast furnaces, 144-D, 279-D, 382-D, 390-D, 394-D
carbon hearths for, 84-D, 206-D, 315-D
charging equipment for, 335-D

Blast furnaces (cont.)
combustion zone in, 297-D
design of, 140-D, 144-D, 190-D, 242-D, 290-D, 327-D, 377-D
hot patching practice for, 163-C
for manganese recovery from slag, 12-A
quenching and digging out of, 209-D
raw-material resources — U.S., 140-D, 144-D, 242-D, 327-D
refractories for, 309-B, 327-B, 59-D, 140-D, 144-D, 242-D, 327-D
relighting of, 246-D
Sheffield Steel Corp. — Houston, Tex., 210-D
slags of, 90-D
smelting zone in, 297-D
stock-level measurement, 224-D
stoves for, 57-D, 347-D, 384-D, 395-D
temperature control in, 167-S
turbo-blowers for, 196-D
Blast-furnace fuels, 335-B
Blast-furnace gas, 238-B, 285-B, 155-D, 44-E
Blast furnace process. See also Iron; or Pig iron
Blast-furnace process, 56-D, 167-D, 190-D, 199-D, 202-D
air treatment for, 273-D
blowing in, 62-D
in Britain, 68-D
carbon-deposition inhibitors in, 319-D
carbon deposition and reducibility, 46-D
charge distribution, 202-D, 276-D
coal and ore preparation for, 235-B
coke in, 296-B, 78-D, 155-D, 306-D, 340-D, 341-D
coke-scrap ratio in, 368-D
desulfurization in, 77-D
dust meter, recording, 286-A
effects on Bessemer steel melts, 289-D
for French ores, 247-D
fuel requirements for, 261-B, 176-D
gas sampling apparatus for, 548
graphical representation of, 362-D
heat recovery from, 159-D
high-pressure, 152-D, 185-D, 192-D
hydrogen in, 176-D, 244-D
iron ores for, 266-B
mixing in, 379-D
ore concentration for, 234-D
oxygen in, 24-D, 140-D, 144-D, 242-D, 273-D, 288-D, 327-D, 340-D, 393-D
raw materials for, 232-D, 273-D
refractories for, 44-D, 194-D
statistical analysis of data, 205-D
sulfur control in, 17-D
thermal effects in, 90-D
Blast furnace process (cont.)
thermodynamics of, 142-D, 176-D
in U. S., 68-D, 140-D, 144-D, 242-D, 327-D
Blast-furnace slags, 222-B, 136-D, 154-D, 208-D, 151-R
alumina content of, 388-D
analysis, chemical, 348-S, 498-S
lead recovery from 189-B
magnesia-content effects, 208-D
magnetic separation of, 189-B
transformations in, 303-D
Blasting. See also Cleaning, abrasive; Cleaning, blast
abrasive, 436-L
liquid, 46-L, 436-L, 976-L
shot, 776-L
Blooming-mill practice. See Rolling
Blooming mills. See also Rolling mills
Blooming mills, 128-F
Boilers,
cathodic protection, 400-R
cleaning, chemical, 108-L
coatings, corrosion-preventive, 400-R
corrosion of, 108-L, 130-R, 132-R, 223-R, 236-R, 316-R, 386-R, 453-R
corrosion prevention of, 400-R, 405-R
corrosion-resisting alloys for, 400-R
forming in fabrication of, 392-G
materials for, 242-G, 482-T
scaling of, 223-R
welding of, 398-K, 462-K, 700-K
Bolts, 591-Q, 93-T
Bolts and nuts
ductility testing of, 28-Q
fatigue strength of, 28-Q
forging, hot, 300-G
hardening, flame, 150-J
hardening, induction, 32-J
heat treatment of, 459-S
manufacture of, 115-F, 11-G, 459-S, 453-T
mechanical properties of stainless-steel 453-T
mechanical testing of steel, 28-Q
stainless-steel inserts, 422-T
standards and specifications for, 305-S, 360-S, 420-S
steels for, 459-S
strength testing of, 28-Q
tensile strength of, 28-Q, 255-Q
Bonderizing. See Phosphating
Bonding, adhesive. See Joining, adhesive
Borides, 284-B, 279-M, 118-V, 134-V
Boring. See Drilling and reaming
Boron
for aluminum-alloy grain refinement, 191-E

Boron (cont.)
as cast-iron nodulizing agent, 199-E, 289-E
resources of, 157-V
solubility in iron, 56-N
spectra, arc, 341-S
Boron alloys, molybdenum, 57-N
Boron carbide, 120-C, 463-G, 504-G, 293-M
Boron carbide compacts, 4-H
Boron cast irons. See Cast irons, alloy, boron
Boron nitride, 254-T
Boron steels. See Steels, alloy, boron
Bourdon tubes, 560-T
Brasses. See also Copper alloys
aging of, 939-Q
alpha, 385-G, 117-M, 272-M, 254-N, 307-N, 366-P, 367-P, 203-Q, 223-Q, 261-Q, 314-Q, 316-Q, 686-Q, 879-Q, 887-Q
aluminum, 159-R
aluminum-manganese, 452-Q
aluminum plating on, 631-L
aluminum removal from, 428-Q
aluminum welding to, 480-K
annealing of, 502-G, 182-J, 41-N
anodizing of, 671-L
application of, 252-R, 179-T, 298-T, 306-T
behavior under elevated temperatures under vacuum, 587-P
beta, 117-M, 166-M, 243-N, 468-P, 203-Q, 327-Q, 700-Q, 739-Q
bonding with rubber, 235-K
casting of, 27-C, 67-C, 197-E, 247-E, 213-Q
cleaning of, 234-L, 713-L, 910-L
coatings for, 214-L, 853-L, 930-L, 988-L
corrosion of, 8-R, 169-R, 311-R, 384-R, 388-R
corrosion inhibitors for, 416-R, 485-R
corrosion resistance of, 186-V
cracking of, 436-S
deoxidation of, 269-E, 397-E
detergents, effect on, 61-R
for dies, plastic-molding, 39-T
diffusion in, 231-N, 291-N
drawing of, 480-G, 500-G, 502-G, 939-Q
ductility of, 1017-Q
elasticity modulus of, 349-Q
electropolishing of, 716-L, 767-L, 910-L
extrusion of, 129-F, 137-F
fatigue strength of, 682-Q, 375-S
finishing of, 264-L, 632-L, 686-L, 772-L
foundry practice, 276-E, 292-E
fracture of, 699-Q
frictional properties of, 396-Q, 429-Q

Brasses (cont.)
grain growth in, 224-N
hardness testing of, 360-Q, 1017-Q
heat ray protection by, 82-P
heat treatment of, 939-Q, 186-V
honing, 204-L
impact strength of columns, 850-Q
machining of, 464-G, 502-G
magnetoelectric effect in, 423-P
mechanical properties of, 213-Q, 186-V
nickel, 219-E, 178-T
patternmaking for, 609-E
peening, shot, 429-G
penetration into sand molds, 71-E
plastic deformation of, 623-Q
polishing of, 687-L, 716-L, 937-L
potentials in sea water, 369-R
in pressure-vessel liners, 212-R
quenching, water-spray, 127-J
red, 10-C, 143-Q, 170-S. See also Copper alloys, lead-tin-zinc
resistivity of, 570-P, 597-P
rolling, cold, 247-F
segregation of iron and phosphorus in, 224-N
solderability of Pb-Sn plated, 606-K
for springs, 375-S
steel welding to, 480-K, 486-K
stress corrosion of, 250-R, 331-R
stress patterns on, 464-Q
stress — strain curves of, 1018-Q
structures, deformation, 163-Q, 939-Q
tensile strength of, 1017-Q
wear resistance of, 984-Q
wear testing of, 519-Q
welding of, 99-K, 690-K
white, 664-L, 874-L
zinc in — economic prospects, 350-A
Brass anodes, 309-L
Brass castings, 206-E, 322-E, 561-E, 587-E, 849-L, 429-T
Brass electrodeposits, 160-L, 504-L
Brass foundries, 383-E
Brass ingots, 104-C
Brass pipes, 405-R
Brass plates, 521-Q
Brass plating, 356-L, 368-L, 479-L, 495-L, 707-L, 297-T
Brass powder products, 83-H, 915-Q
Brass rotors, 29-H
Brass scrap, 31-R
Brass sheets, 264-F, 385-G, 85-J
Brass single crystals, 475-Q, 476-Q
Brass strip, 112-H, 71-J, 85-J
Brass tubing, 21-F, 76-F, 129-F, 137-F
Brass welds, 480-K
Brass wires, 3-R

Brazil, mineral resources of, 119-B, 213-B
Brazing, 102-K, 125-K, 145-K, 312-K, 313-K, 336-K, 411-K, 417-K, 424-K, 449-K, 774-K, 201-T
applications of, 427-K, 740-K, 758-K, 490-T
book, 79-G
brass or bronze powders in, 531-T
controlled atmospheres for, 36-J
cost analysis in, 275-J
design for, 274-G, 553-K
equipment for production-line, 715-K
furnace, 206-K, 334-K, 389-K, 740-K, 741-K
heating methods for, 166-K
high-vacuum, 119-C
induction, 152-K, 213-K, 741-K
joint design for, 801-K
powder process, 641-K
resistance, 243-K
restoration of machinery by, 806-K
silver, 455-K, 516-K
torch, 428-K, 613-K
Brazing alloys, 296-K, 336-K, 424-K, 457-K, 662-K, 821-L, 838-L, 419-S
Brazing fluxes, 285-K, 296-K, 336-K
Bridges
aluminum and alloys in, 204-T, 504-T
copper and alloys in, 193-T
cutting, flame, 253-G
resistance coils for, 193-T
steels for, 226-Q, 477-Q, 41-T
welding of, 541-K, 573-K, 736-K, 805-K
Brillouin zones, 17-M
Brinell testing. See Hardness testing
British Cast Iron Research Assn., 56-A
British Iron & Steel Research Assn., 22-A
British Non-Ferrous Metals Research Assn., 90-A, 50-R
British Welding Research Assn., 853-Q
Brittleness. See also Embrittlement; Temper brittleness; Toughness
Brittleness, 501-Q, 861-Q
Broaches, 374-Q
Broaching, 301-G
Broken Hill Pty. Co. Ltd., 159-A
Bronzes. See also Copper alloys
aluminum
casting of, 394-E
in castings, high-pressure, 307-E
for cast-iron brazing, 477-K
as coatings, corrosion-preventive, 481-R
creep of, 741-Q
drawing, deep, 160-G
fatigue strength of, 741-Q
gating systems for, 523-E, 530-E
heat treatment of, 146-N
Bronzes (cont.)
aluminum (cont.)
mechanical properties of, 146-N, 438-Q
melting, suspension, 495-E, 578-E
microstructure of, 307-E, 438-Q
resistivity of, 366-P
solidification of, 307-E, 523-E, 530-E
transformation in, 146-N, 326-N
in turbines, 169-T, 218-T, 337-T
in welding rods, 4-K
aluminum-iron-nickel, 102-M
aluminum-nickel, 432-E, 508-Q
analysis, spectrographic, 14-S
beryllium, 443-E, 620-E, 653-E, 200-J
casting of, 6-E, 7-E, 75-E, 148-E, 247-E, 349-E, 367-E, 9-H
chromium-molybdenum-nickel, 71-V
corrosion of ancient, 282-A
drawing of, 500-G
elimination of aluminum in, 645-E
embossing of, 409-T
foundry practice, 79-E, 276-E
frictional properties of, 396-Q, 484-T
for gears, self-lubricating, 484-T
grinding, abrasive, 212-G
heat ray protection by, 82-P
iron, 133-K
lead, 151-E, 274-M, 273-S
lead-nickel, 71-V
lead-zinc, 88-Q
machining of, 251-S
manganese, 197-E, 416-E, 466-E, 530-E, 69-R, 384-S
manganese-nickel, 32-V
melting of, 162-E
nickel, 8-H, 456-K
phosphor, 420-E, 119-F, 304-F, 176-G, 459-G, 375-S, 986-Q
production of, 11-A, 102-C
resistivity of, 570-P
shell molding of, 128-E, 316-E, 390-E, 405-E, 422-E, 505-E
silicon, investment casting of, 515-E
solidification of, 79-E
for surfacing, hard, 608-L
Swedish standards for, 170-S
tin
analysis of, 289-S
applications of, 249-E, 61-T
casting of, 126-E, 197-E
conductivity, electrical, 433-P
conductivity, thermal, 433-P
electropolishing of, 777-L
foundry practice — book, 126-E
gating systems for, 523-E, 527-E
hardening, quench, 254-J
resistivity of sintered, 433-P
solidification of, 523-E, 527-E

Bronzes (cont.)
tin (cont.)
tempering, 254-J
welding of, 319-K, 790-K
Bronze castings, 246-E, 432-E, 429-T
finishing, mechanical, 322-E, 587-E
impregnation, 206-E
investment, 515-E, 849-L
mechanical properties of, 349-E
molding materials for, 484-E, 429-T
nondestructive testing, radiographic, 79-E
production at Chautaugua Hardware Co., 561-E
sand-grain distribution vs. casting finish, 91-E
Bronze electrodeposits, 429-L
Bronze foundries, 383-E
Bronze ingots, 104-C
Bronze plating, 426-L, 429-L, 441-L
Bronze powders, nickel, 78-H
Bronze powder products, 17-H, 63-H, 80-H, 433-P
Bronze welding. See Brazing
Bronze wires, 3-R
Brushing, 571-L, 695-L
Buckling strength. See Compression strength
Buffing. See Polishing
Buffing, ball. See Tumbling
Buffing compounds, 115-L, 680-L
Buildings. See also Structures
Buildings
aluminum and alloys in, 35-T, 185-T, 188-T, 195-T, 244-T, 286-T, 287-T, 316-T, 395-T, 398-T, 401-T, 402-T, 417-T, 444-T, 473-T, 475-T, 476-T, 487-T, 488-T, 489-T, 503-T, 505-T, 519-T
bolting in construction of, 278-K
copper sheets, lead-coated, for roofs, 410-T
metals in, 307-T
riveting in construction of, 278-K
stainless steels in, 185-T, 244-T, 437-T
steel specifications for, 476-S
welding in construction of, 35-K, 96-K, 223-K, 229-K, 275-K, 278-K, 286-K, 402-K, 463-K, 582-K, 699-K, 707-K, 722-K, 760-K
Bulgaria, mineral resources of, 292-B
Burnishing, ball. See Tumbling
Burnishing, barrel. See Tumbling
Bursting strength, 862-Q
Cables, 51-T, 561-T
Cadmium
analysis of, 220-S, 265-S, 271-S, 363-S
applications of, 164-V
condensation of vapor, 40-P
conductivity, thermal, 22-P
corrosion of, 82-R, 173-R
corrosion inhibitors for, 508-R
corrosion prevention of, 967-L
creep of, 744-Q, 1052-Q
crystal growth of, 47-N
economic trends, 95-A
electrodeposition of, 397-L
electrometallurgy of, 17-B
evaporated deposits — electron microscope studies of, 448-M
frictional properties of, 572-Q
impregnation into carbon, 570-T
magnetic properties of, 150-P
melting point of, 451-P
microscopy, polarized-light, 391-M
phosphating of, 539-L
plastic deformation of, 286-Q
production of, 164-V
properties of, 164-V
recovery from zinc ores, 93-C, 157-C, 158-C
shear strength of, 564-Q, 744-Q
solidification shrinkage of, 377-E
solubility in aluminum, 138-N
solubility in HCl-CH_3OH-H_2O solutions, 249-P
solubility in mixture of cadmium chloride with other chlorides, 171-P
superconductivity of, 137-P, 524-P, 550-P
tarnishing of — selenium blocking effect, 361-P
thermodynamic properties of, 217-P
twinning of, 173-Q, 476-M
vapor pressure of, 40-P, 451-P
viscosity of, 153-P
wear resistance of — against plastic, 973-Q
Young's modulus, 710-Q
Cadmium and alloys, 83-L
Cadmium alloys
antimony, 286-P
bismuth-tin, 422-M, 581-P
copper, 178-M
lead-tin-zinc, 153-M
magnesium, 248-M, 469-M, 65-P
nickel, 173-L
palladium, 98-M
platinum, 152-M
silver, 529-Q
zinc, 114-C, 377-E
Cadmium coatings, 560-L, 764-L, 805-L, 231-S, 233-S

Cadmium electrodeposits, 786-K, 424-L, 762-L, 195-R, 510-R, 321-S
Cadmium-nickel batteries, 430-T
Cadmium ores, 17-B
Cadmium oxide, 176-M
Cadmium plating,
copper, 717-L
of small parts, 784-L
tin, 718-L
Cadmium single crystals,
glide bond in, 378-Q
gold, 239-N
growth of, 284-N
mechanical properties of, 646-Q
twinning in, 449-Q
Cadmium wires, 449-Q
Calcium,
in aluminum-silicon alloys, 446-S
analysis of, 348-S
applications of, 122-V
in cast irons, nodular, 366-M
casting and melting of, 192-E
distillation of, 7-C
electrometallurgy of, 141-C
emissivity, thermionic, 151-P
metallurgy, extractive, 122-V
nitrogen removal from, 137-N
oxidation of, 75-R
properties of, 122-V
thermodynamic properties of, 217-P
for zirconium degasification, 137-N
Calcium alloys
lanthanum, 207-M
lead, 188-N
rubidium, 107-P
Calcium carbide, 141-B
Calorimeters, 500-P
Canada,
aluminum industry of, 284-A, 296-A, 41-V
chromium ore resources of, 87-B, 169-B
coal, coking — resources of Western, 212-B
iron-ore resources of, 211-B, 67-B
magnesium industry of, 99-C
metalworking statistics for, 162-A, 163-A
steel production in, 161-A, 198-A
Capillarity. See Surface tension
Carbides, 92-V
applications of, 118-V, 120-V
for ceramic-insulator fabrication, 313-T
classification of, 46-V
compounded with titanium, 81-V
density vs. wear resistance, 250-G
diffraction, x-ray, 427-M
directory of, 120-V
drilling, vibratory, 65-G
Carbides (cont.)
etchants, metallographic, 10-M
fabrication of, 35-G
German developments, 13-V
grinding of, 182-G, 343-G, 344-G
for hammer-mill tips, 447-T
hardness of, 642-Q
hardness of — grinding-direction effects, 145-Q
in heat-resisting alloys, 382-M
heat treatment of, 120-V
hot pressing of, 40-H
joining to nonmetals, 497-K
mechanical properties of, 16-G
microscopy of, 427-M
machining of, 180-G, 206-G, 296-G
electric-spark, 30-G, 421-G
electromechanical, 201-G, 290-G, 363-G
ultrasonic, 421-G, 463-G
mechanical properties of, 517-Q
mechanical testing of, 376-S
metallography of, 376-S
microstructure of, 87-H
new, 154-S
physical properties of, 517-Q
production of, 195-B, 102-C, 5-H, 39-H, 118-V
properties of, 118-V
reactions with metals, 492-P
as refractories, 195-B, 284-B
steel reaction with, 64-Q, 485-Q, 696-Q
structures, atomic, 382-M
in tools, 37-G, 140-G, 498-G
wear resistance of, 250-G, 169-Q, 447-T
Carbide dies, 92-H
Carbide powders, 95-H
Carbide scrap, 119-A
Carbide tools, 108-T, 109-T, 529-T
applications of, 16-G, 476-G
bending and twisting of, 280-G
brazing, butt, 24-G
cutting fluids for, 468-G
design of, 219-G
design of — book, 425-G
economics of use, 74-G
failures of, 454-G, 376-S
grinding of, 417-G, 283-G, 418-G
helical cutter, 450-T
for machining ferrous metals, 26-G
for machining, 219-G, 404-G
for mine drilling, 59-T
production of, 237-G
wear during cutting of steel, 576-Q
wear resistance of, 64-Q, 485-Q, 696-Q
for working, cold, 131-Q
Carbon. See also Graphite
Carbon, 270-S, 358-S, 381-S, 89-V
Carbon steels. See Steels

Carbonitriding. See Hardening, case
Carburizing. See Also Hardening, case
Carburizing, 128-J, 133-J, 196-J, 198-J, 276-J
Case hardening. See Hardening, case
Cast brass. See Brass castings
Cast irons. See also Iron castings
aluminizing of, 503-L
aluminum bonding to, 665-L
annealing of, 203-J
analysis of, 654-E, 43-S, 58-S, 243-S, 268-S, 357-S, 440-S, 524-S, 525-S
applications of, 234-Q, 452-Q, 72-T, 160-T, 214-T, 490-T
austenite-martensite transformation in, 110-N
austenite phase in, 24-M
bending strength of, 951-Q
brazing of, 174-K, 187-K, 364-K, 477-K, 589-K, 821-L, 838-L
calcium silicide inoculation of, 120-E
carbon pickup, 455-E
carburization, cupola, 78-E
chilling properties of, 649-E
for cinder pots, 627-E
cleaning of, 257-L
coatings for, 39-A, 12-L, 139-L, 214-L, 773-L, 853-L, 969-L, 999-L, 396-R
corrosion of, 14-R, 15-R, 66-R, 69-R, 93-R, 99-R, 157-R, 201-R, 261-R, 384-R, 445-R
corrosion inhibitors for, 48-R, 87-R
corrosion testing of, 513-R
cracking of, 228-R
cutting of, 122-G, 414-G, 495-G, 589-K
cutting feeds and speeds, 44-G
defects in, 20-E, 24-E, 57-M
dephosphorization, cupola, 78-E
designing with, 418-E
desulfurization, cupola, 78-E
for dies, plastic-molding, 39-T
die casting of, 490-T
ductile, 96-A
economic trends, 97-V
enameled, 533-L
enameling, porcelain, 153-D, 78-L, 105-L, 301-L, 449-L, 533-L
etchants, metallographic, 413-M
expansion, thermal, 78-L
failure of, 431-Q, 1010-Q
finishing, mechanical, 999-L
fluidity of — composition effects, 29-E
foundry practice, 236-A, 396-D, 94-E, 103-E, 240-E, 279-E, 295-E, 348-E, 544-E
gases in, 654-E, 400-E, 7-N
graphite nodulization in, 146-E, 156-E, 34-N
Cast irons (cont.)
graphitization of, 170-M, 7-N, 26-N, 110-N, 186-N, 222-N, 241-N, 269-N, 300-N
gray
applications of, 492-T
bauxite pig iron for, 163-E
brazing of, 255-K, 720-K
briquetting of borings and turnings, 235-A
bursting strength of safety disks, 862-Q
corrosion tests on, 75-T
cutting of, 720-K
design for, 176-E, 257-E
desulfurization of, 73-E
fatigue tests on, 603-Q
fluidity of, 132-E
formation of, 112-E
foundries for — book, 169-A
foundry practice, 61-E
frictional properties of, 396-Q, 945-Q
gating of, 170-E
hardness of, 27-Q
heat treatment of, 1-J, 103-J, 147-J, 27-Q
machinability of, 73-E, 153-G, 391-G, 405-G, 510-G
machining of, 405-G
mechanical properties of, 492-T, 54-Q
melting of, 89-E, 640-E
microstructure of, 75-T, 27-Q
molding, 136-E
physical properties, 75-T
plastic deformation of, 1061-Q
production of, 196-E, 313-E
production of — book, 409-E
refining of, 73-E
shell molding of, 128-E, 371-F, 390-E, 422-E
solidification of, 85-E, 511-E
strength properties of, 945-Q, 959-Q
structure of, 959-Q
in structures, 492-T
tensile strength of, 389-Q
titanium effects on, 109-E
volume sensitivity of, 731-Q
wear resistance of, 945-Q, 27-Q
welding of, 174-K, 255-K, 720-K
grinding, abrasive, 212-G
growth of — effects of Si, Mn, and P, 63-P
hardenability of, 422-Q
hardening of, 14-J, 20-J, 42-J, 105-J, 143-J
hardness of, 422-Q, 951-Q
heat treatment of, 203-J
high-strength, 594-E
for high temperatures, 228-R

Cast irons (cont.)
impact strength and testing of, 615-Q
joining, adhesive, 5-K
joining to rubber, 142-K
machinability of, 631-E, 205-G, 376-G, 422-Q
machining of, 3-G, 219-G, 232-G, 251-S
machining properties of, 418-E
magnesium-treated, 614-E
malleable
for agricultural uses, 559-T
annealing of, 26-E, 27-E, 7-J, 25-J, 26-J, 46-J, 144-J, 277-J
briquetting of borings and turnings, 235-A
British developments, 276-E
cleaning, chemical, 624-L
cupola tuyeres for melting of, 504-E
defects in, 26-E
design strength of, 1038-Q
fluidity of, 299-E
foundry practice, 76-E, 97-E
graphitization of, 629-E
hardening of, 5-J, 164-J
hardness of, 7-J
hot tears in, 299-E
mechanical properties of, 54-Q
melting of, 26-E, 510-E
melting-furnace-atmosphere effects, 299-E
microstructure of, 648-E
patterns for, 314-E
production of, 27-E, 560-E
refractories for, 217-D
shrinkage cavities in, 448-E
specifications for — book, 366-S
tensile strength of, 7-J
theory of malleablizing, 269-J
mechanical properties of, 252-E, 418-E, 433-G, 98-K, 49-Q, 547-R, 97-V
Meehanite, 13-E, 272-E, 394-G, 223-J
melting of, 261-D
metallurgy of, 212-A, 112-E
microstructures of, 252-E, 57-M, 385-Q, 524-S, 97-V
molten, 65-E, 549-E
mottle formation in, 649-E
nodular, 212-A, 452-Q, 87-V
annealing of, 365-M
applications of, 552-T, 559-T, 116-V, 128-V
calcium effects, 366-M
cerium in, 498-Q
corrosion of, 445-R
corrosion resistance of, 18-V
for crankshafts, 101-E, 264-E
cupola melting of, 58-E
ductility of, 101-Q

Cast irons (cont.)
nodular (cont.)
economic trends, 116-V
fabrication of, 173-V, 179-V
fatigue resistance of, 1055-Q
fatigue strength of, 47-Q
formation of, 21-E, 110-E, 112-E, 228-E, 6-N, 269-N
formation of nodules in Mg-treated, 34-N
fracture strength of, 871-Q
French vs. U. S., 101-Q
frictional properties of, 396-Q, 945-Q
graphitization of, 65-N, 93-Q
growth of — silicon effects, 91-Q
hardening, quench, 41-J
heat resistance of, 1055-Q
heat treatment of, 18-V, 173-V, 179-V
impact strength of — at high temperatures, 871-Q
machinability of, 401-E, 605-E, 404-G, 173-V, 179-V
machining of, 404-G
magnesium in, 66-N
mechanical properties of, 401-E, 406-E, 478-E, 366-M, 54-Q, 91-Q, 93-Q, 101-Q, 653-Q, 808-Q, 396-T, 552-T, 18-V, 173-V, 179-V
microstructure of, 36-M, 231-M, 282-M, 365-M, 366-M
nodules and nuclei in, 109-M
oxidation, high-temperature, 445-R
phosphorus in — effects of, 1085-Q
physical properties of, 173-V, 179-V
production of, 261-D, 168-E, 199-E, 224-E, 256-E, 289-E, 312-E, 346-E, 401-E, 406-E, 476-E, 594-E, 605-E, 116-V
properties of, 116-V
residual-element effects, 498-Q, 450-S
shell molding of, 371-E
shot-peened, 90-G
solidification in sand molds, 297-E
strength properties of, 945-Q
structure, internal, 552-T
supply situation, 129-A
tempering, 41-J
tensile strength of, 871-Q
tensile testing of, 101-Q
in troughs for molten aluminum, 418-T
wear resistance of, 848-Q, 945-Q, 1055-Q
welds, 547-K
weldability of, 1055-Q, 173-V, 179-V
working of, 173-V, 179-V
nodulizing agents for, 199-E, 289-E
nondestructive testing of, 240-S, 516-S
oxidation of, 544-E, 445-R
packaging, corrosion-preventive, 317-R, 365-R

Cast irons (cont.)
patternmaking for, 609-E
peening, shot, 433-G
phase diagrams of, 364-M
physical properties of, 418-E
pitting of, 547-R
plastic deformation of, 431-Q
Poisson's ratio of, 149-Q
polishing of, 937-L
production of, 78-A
quenching of, 135-N
research on, 56-A, 276-E, 475-E
sand casting of, 11-E, 207-E, 280-E, 342-E, 347-E, 391-E, 596-E
scaling of, 228-R
shell molding of, 316-E, 405-E, 505-E
solidification of, 400-E, 545-E, 546-E, 7-N
specifications for, 314-S
specifications for — book, 366-S
strength of, 307-Q
stresses in, 105-L, 283-Q
structures of, 197-M
structure, crystal, 50-M, 170-M
superfinishing of, 96-G
surfacing, hard, 324-L
swaging of, 304-F
tearing, hot, 427-Q
temperature measurements in, 550-S
tensile strength of, 952-Q
tensile testing of, 554-Q
transformations of, 112-E, 186-N
wear resistance of, 158-Q, 730-Q
weldability of, 174-K
welding of, 147-K, 174-K, 477-K
white, 90-E, 112-E, 51-M, 464-M, 27-N, 135-N, 425-Q

Cast irons, alloy
aluminum, 733-Q
aluminum-chromium, 733-Q
applications of, 937-Q
boron, 144-J
chromium-molybdenum-nickel, 32-M
chromium-nickel, 528-E, 624-Q, 843-Q
chromium-silicon, 92-Q
corrosion, acid, sulfuric, 205-R
drilling of Meehanite, 394-G
frictional properties of, 945-Q
in grinding wheels, 475-G
hardenability of Meehanite, 223-J
hardening, flame, 624-Q
heat treatment of, 223-J, 624-Q
for high temperatures, 937-Q
impact strength of, 937-Q
manganese-molybdenum-nickel, 424-Q
manganese-silicon, 203-J
mechanical properties of, 75-Q
melting of, 510-E

Cast irons, alloy (cont.)
nickel, 41-R, 127-V
nitriding, 624-Q
production of — book, 409-E
resistivity of, 488-P
silicon, 650-L
strength properties of, 945-Q
tensile strength of Meehanite, 223-J
titanium, 109-E
wear resistance of, 937-Q, 945-Q

Cast iron pipes, 350-E, 574-E, 611-E, 91-L, 46-R, 102-R, 257-R, 522-T

Cast-steel bars, 68-E

Cast steel. See also Steel castings
analysis of, 43-S
bend and vibratory stress of, 283-Q
creep of, 172-Q, 364-Q, 1009-Q
forging of, 452-Q
foundry practice, 164-D, 292-D, 60-E, 102-E, 254-E, 273-E, 276-E, 279-E, 310-E
fractures in, 1009-Q
gates and heads for, 173-E
heat treatment of, 132-M
impact strength of, 184-Q
mechanical properties of, 132-M, 5-Q
melting of, 5-Q
patterns for, 314-E
pipes of, 174-D
shell molding of, 128-E, 390-E
strength of, 307-Q
stresses, internal, 1048-Q
tensile strength of, 184-Q
welding of, 155-K, 645-K

Cast steels, alloy
chromium-molybdenum, 90-Q
chromium-nickel, 274-E
foundry practice, 273-E
manganese, 274-E, 617-E
rare earths, 987-Q

Castings. See also Foundry practice
annealing, stress-relief, 246-J
brazing in assembly of, 706-K
cleaning of, 236-E, 512-L, 692-L
defects in, 125-E, 239-S
design of, 323-E, 555-E, 613-E
finishing of precision, 580-L
gating practice for, 522-E, 523-E, 525-E, 526-E, 528-E, 534-E
impregnation of, 30-E, 56-E, 100-E, 122-E, 206-E, 604-E, 657-E
inspection of, 239-S, 254-S
internal stress in, 652-E
investment, 849-L
nondestructive testing of, 36-S, 70-S, 74-S, 468-S
permanent-mold, 8-H, 930-Q
porosity of, 122-E

Castings (cont.)
sand, 291-E
sand-grain distribution vs. casting finish, 91-E
solidification of, 260-D
statistics, production, 117-E
as substitutes for tooling of metal products, 202-T
thermodynamics of cooling, 638-E
Cathodic protection. See also Corrosion prevention
Cathodic protection 9-R, 10-R, 256-R, 440-R, 460-R, 515-R
of chemical equipment 398-R
electrical nature of, 180-R
ground beds in, 431-R
of heating and plumbing equipment, 370-R
of iron structures (underground), 189-R
mechanism of, 430-R
of pipelines, 443-R
potential measuring equipment, 128-R
for radiant heating systems, 191-R
in refineries, 88-R, 158-R
of ships, 197-R, 435-R
of tanks, storage, 270-R
theory of, 53-R
Cathodic sputtering. See Sputtering, cathodic
Cavitation, 429-G, 468-R, 305-R
Cemented carbides. See Carbides
Centrifugal casting, 1-E, 48-E, 207-E, 229-E
Ceramics, 463-G, 655-L
Ceramic-metal bonding. See Metal-ceramic bonding
Ceramic-metal combinations, 934-L
applications of, 482-L, 793-L, 115-T, 134-T, 68-V
design of, 793-L
fabrication of, 793-L
fatigue testing of, 434-Q
for high temperatures, 100-H, 35-Q, 117-V, 156-V
mechanical properties of, 100-H, 35-Q
oxidation of, 100-H, 164-Q
polishing, 281-L
properties of, 793-L, 164-Q
quality control in production of, 39-H
reactions of, 492-P
thermal shock testing, 57-Q
for turbines, gas, 85-H
Cerium,
in cast irons, nodular, 498-Q
for cast-iron nodulizing, 424-Q
conductivity, electrical, 466-P
melting of, 254-T
oxidation of, 152-R, 136-R
production of, 25-C, 30-C, 47-C, 56-C
in stainless steels, 12-F
Cerium (cont.)
in steels, 98-E, 80-S
surface treatment of steels with, 106-M
Cerium ores, 371-B
Cermets. See Ceramic-metal combinations
Cesium, 132-P
Chain, 368-T
Charpy testing. See Impact testing
Chemical cleaning. See Cleaning, chemical
Chemical equipment
alloy selection for, 4-R
alluminum and alloys in, 571-K, 42-R, 44-T, 269-T
cast irons for caustic manufacture, 41-R
cathodic protection of, 398-R
cavitation attack on, 492-R
coatings, paint, 526-L
construction materials for, 445-K, 192-T
corrosion of, 324-R, 492-R, 535-R
corrosion-resisting alloys for, 425-R, 271-T
electroplating of, 807-L
embrittlement, caustic, 492-R
failures, service, 492-R
nickel alloys for, 294-T
piping materials for, 70-T
precious metals in, 23-T
stainless steels, chromium, in, 161-V
steels, clad, in, 840-L
testing of, 141-R
welding of, 242-K, 434-K, 445-K
Chemistry, inorganic, Hofmann's handbook and Test, 72-P
Chlorimets. See Nickel alloys, chromium-molybdenum
Chromating, 835-L
Chrome-magnesite, 215-D
Chromium,
in aluminum-alloy grain refinement, 35-E
analysis of, 358-S
applications of, 177-A, 102-V
as cast-iron nodulizing agent, 199-E, 289-E
coatings, protective, 926-L
corrosion, acid, 241-R, 397-R
corrosion prevention of, 967-L
economic trends, 95-A, 104-A
electrochemical behavior in HNO_3, 241-R
electrodeposition of, 405-L, 653-L, 961-L
electrometallurgy of, 141-C
forging of, 153-C
frictional properties of, 572-Q
heat resistance of, 153-C
high-purity, 153-C, 331-P
machining of, 484-G
magnetic properties of, 143-P

Chromium (cont.)
manganese solid solution in, 1-M
melting, arc, 153-C
oxidation of, 504-R
properties of thin films on, 111-P
recovery from wastes, 278-A, 307-A, 339-A
resistivity of, 87-P
rolling of, 153-C
solidification point of, 1-M
specific heat of, 127-P, 501-P
spectroscopy of, 521-P
in steelmaking, basic, 37-D
structure, crystal, 272-M
supply situation, 177-A
swaging of, 153-C
transformations, allotropic, 331-P
vapor pressure of, 504-R
waste disposal, 60-A
Chromium alloys,
aluminum, 188-N
antimony, 125-P
cobalt, 146-G, 238-P
cobalt-columbium-iron-manganese-molybdenum-nickel, 51-S
cobalt-columbium-iron-manganese-molybdenum-nickel-tungsten, 458-Q, 479-Q
cobalt-columbium-iron-molybdenum-nickel-tungsten, fracture strength of, 899-Q
cobalt-iron, 193-M, 159-P
cobalt-iron-nickel, 128-M, 240-Q, 804-Q
cobalt- molybdenum, 193-M, 241-M, 147-N
cobalt-molybdenum-nickel, 241-M
cobalt-nickel, 127-M, 193-M
cobalt-tungsten, 147-N
columbium, 61-M
copper, 188-N
cutting fluids for, 150-G
iron, 497-K, 296-M, 422-P, 241-R, 280-R, 489-R, 255-S
iron-manganese, 296-M
iron-molybdenum, 238-P
iron-nickel, 352-M, 383-M, 394-M, 159-P, 376-Q, 255-S
iron-tungsten, 238-P
manganese, 281-M, 200-N
molybdenum-nickel, 484-G, 193-M, 241-M
molybdenum-nickel-tungsten, 484-G
nickel, 24-K, 690-K, 194-M, 325-M, 172-Q, 364-Q, 49-R, 280-R
tantalum, 61-M
tellurium, ferromagnetic properties of, 509-P
titanium, 470-M, 257-N, 114-R
tungsten, 326-M
zirconium, 115-M
Chromium carbides, 707-Q, 824-Q, 1028-Q, 3-V
applications of, 3-V, 19-V, 22-V, 144-V, 147-V
corrosion resistance of, 824-Q, 486-R, 147-V
for gages, precision, 19-V, 22-V
mechanical properties of, 19-V, 22-V, 147-V
physical properties of, 19-V, 22-V, 147-V
Chromium cast irons. See Cast irons, alloy, chromium
Chromium coatings, 782-L, 842-L
Chromium compacts, 4-H
Chromium electrodeposits, 643-L, 289-L
on aluminum, 956-L
on automobile parts, 381-L, 505-L, 510-L
coatings for, 217-L, 504-L, 600-L, 667-L, 853-L
elastic properties of, 250-Q
grinding, 654-L
growth of, 153-L, 530-L
nickel, 174-R
polishing, 654-L
properties of, 235-L, 633-L
wear resistance of, 413-L, 1091-Q
Chromium ores
concentration of, 87-B, 155-B, 272-B, 273-B, 274-B
resources of, 87-B, 169-B, 293-B, 102-V
Chromium oxide system, 416-M
Chromium-plated parts, 190-L, 872-L
Chromium plating, 74-L, 556-L
on aluminum, 414-L, 100-R
applications of, 434-L, 450-L, 507-L, 525-L, 705-L, 738-L, 774-L, 895-L, 987-L
on copper, 238-L
of dies, 366-G
hard, 145-L, 389-L, 825-L, 833-L
on magnesium die casting, 100-R
National Bureau of Standards research, 49-L
nickel, 84-L, 94-L, 873-L
pretreatment for, 491-L
rate calculations, 485-L, 576-L
review on, 202-L
solutions for, 360-A, 278-A, 41-L, 174-L, 242-L, 425-L, 471-L, 572-L, 633-L, 763-L, 83-S, 227-S, 455-S
of steels, 349-L, 586-Q
with undercoats, 869-L, 929-L
of zinc die castings, 677-L, 100-R
Chromium powders, 811-L, 401-P
Chromium printing, 215-M
Chromium steels. See Steels, alloy, chromium; Stainless steels, chromium; or Toolsteels, chromium

Chromium wastes, 40-A, 41-A
Chromizing, 301-A, 62-L, 151-L, 219-L, 283-L, 782-L
Civil-engineering equipment, 437-G, 90-K, 349-K, 659-K, 708-L, 331-T, 336-T, 479-T
Cleaning
abrasive, 40-L, 769-L, 812-L
alkali, 753-L
barrel, 512-L
blast, 132-L, 267-L
of castings, 194-L
chemical, 412-G, 138-L, 215-L, 335-L, 595-L, 663-L, 724-L, 725-L, 775-L, 776-L, 818-L, 824-L
flame, 521-L, 669-L, 776-L
mechanical, 412-G, 48-L, 208-L, 513-L, 571-L, 755-L, 766-L, 776-L
of metals, 187-L, 610-L
spray, 263-L
technical developments in, 103-L
ultrasonic, 17-L, 303-L, 331-L, 968-L, 418-S
Cleaning agents, 920-L, 977-L
Cleavage. See Plastic deformation
Coal, 212-B, 235-B, 67-D, 493-R
Coarsening. See Grain growth; or Recrystallization
Coatings, anodic. See Anodizing
Coatings,
antifouling, 97-R
bituminous, 443-L, 668-L, 415-R
bright-dip, 424-L
cathodic, 47-L
ceramic, 297-L, 535-L, 550-L, 888-L. See also Enamels, porcelain
applications of, 292-L, 702-L, 749-L, 51-S
for heat-resisting alloys, 98-L, 161-L, 487-L, 502-L, 20-L
for high temperatures, 1-L, 482-L, 803-L
National Bureau of Standards work, 88-L
chemical, 189-L, 595-L, 610-L
chromate. See Chromating
corrosion-preventive, 259-L, 518-L, 538-L, 91-R, 121-R, 162-R, 166-R, 281-R, 293-R, 440-R, 481-R
corrosion-resistant, 507-T
decorative, 252-L
dichromate. See Chromating
dip, 786-K, 290-L, 348-L, 858-L
electrochemical, 296-R
electrostatic spray, 266-L, 757-L, 817-L, 858-L
Coatings (cont.)
enamel, 82-L, 262-L, 578-L, 662-L, 942-L. See also Enamels, porcelain
flame-sprayed, nonmetallic, 585-L
flow, 86-L
heat-resisting, 803-L, 117-V, 156-V
hot-dip. See Coatings, dip
hydrophobic, 169-L
immersion. See Coatings, dip
lacquer, 238-L, 262-L, 477-L, 511-L, 536-L, 862-L, 878-L. See also Coatings, paint
metallic, 44-L, 192-L, 310-L, 393-L, 656-L, 706-L, 728-L, 736-L, 443-P, 444-P, 446-P, 448-P, 450-P, 475-P, 510-R, 171-S
nonferromagnetic — for iron, 300-S
nonmetallic, 794-L
organic, 18-L, 23-L, 31-L, 34-L, 45-L, 141-L, 247-L, 442-L
oxide, 549-L
paint, 284-L, 300-L, 310-L, 663-L, 783-L, 892-L
adhesion studies, 942-L
applications of, 12-L, 223-L, 298-L, 338-L, 561-L, 562-L, 563-L, 564-L, 565-L, 672-L, 708-L, 739-L, 776-L, 787-L, 804-L, 883-L
aluminum powders in, 74-H, 82-H
baking and drying, infrared, 802-L
blistering in sea water of, 140-L
book, 421-L
for chemical atmospheres, 526-L
defects in — causes and remedies, 72-L
equipment for application of, 746-L
fungicidal properties of, 511-L
of gas holders — flotation method, 79-L, 831-L
inflammability of, 326-A
ingredients of, 199-L, 551-L, 596-L, 627-L, 785-L
permeability, water-vapor, 465-L
resin prime coat, 712-L
roller process, 251-L
on steel — breakdown in sea water, 20-R
surface preparation for, 412-G
paint-spray, 672-K, 232-L, 246-L, 448-L, 860-L
for pipelines, 13-P, 140-P
plastic, 329-L, 412-L, 575-L, 619-L, 621-L, 639-L, 640-L, 643-L, 668-L, 771-L, 899-L, 904-L, 415-R
protective, 93-G, 21-L, 252-L, 523-L, 586-L, 809-L, 810-L, 339-R
refractory. See Coatings, ceramic; or Enameling, porcelain

Coatings (cont.)
resinous. See Coatings, plastic
roller. See Coatings, paint
rubber, 404-L, 781-L, 835-L
silver, 449-P
spray. See Coatings, paint spray; or Coatings, sprayed-metal
sprayed-metal, 300-A, 635-K, 128-L, 446-L, 529-L, 566-L, 605-L, 816-L, 858-L, 945-L, 223-L
sputtered, 475-L
strength properties of, 327-L
vacuum-deposited, 119-C, 193-L, 285-L, 328-L, 432-L, 433-L, 438-L, 475-L, 476-L, 520-L, 536-L, 980-L, 124-M, 415-M
wax, 579-L
wear-resisting, 270-J
weld-deposited. See Weld-Deposited Coatings
Cobalt
analysis in aluminum alloys, 362-S
applications of, 177-A, 100-B, 541-T
in ceramic combination, 42-H
conductivity, electrical, 466-P
creep of, 962-Q
determination, spectrophotometric, 91-S
economic trends, 95-A, 226-A
effect on properties of cementite, 187-P
electrometallurgy of, 17-B, 141-C
emissivity of, 436-P
in enamels, porcelain, 501-L, 543-L, 554-L, 558-L, 638-L
ferromagnetic properties of, 598-P
gyromagnetic effect, 518-P, 519-P
magnetic properties of, 150-P, 417-P, 479-P
magnetic strength of, 105-P
magnetostrictive properties of, 430-P
microscopy, polarized-light, 391-M
neutron cross section of, 48-P, 268-P
preparation for cobalt oxides, 165-C
radioactive, 481-S
recovery from iron ores, 82-B, 100-B
recovery from scrap, 249-A, 77-C, 78-C, 79-C, 90-C, 94-C, 100-C, 106-C, 109-C, 112-C, 149-C
refining of, 314-A
resistivity at low temperatures, 479-P
specific heat, 285-P
structures, magnetic, 299-P
supply situation, 177-A
transformations in, 310-N, 312-N
Cobalt alloys,
aging of, 72-H
aluminum-nickel, 327-P, 517-P
applications of, 186-T
beryllium, 134-M
Cobalt alloys (cont.)
chromium, 146-G, 281-M, 238-P
chromium-columbium-iron-molybdenum-nickel-tungsten, 4-G, 148-N, 899-Q
chromium-iron, 193-M, 159-P
chromium-iron-nickel, 128-M, 240-Q, 804-Q
chromium-molybdenum, phase diagram of, 193-M, 241-M, 147-N
chromium-molybdenum-nickel, 10-M, 241-M, 290-T
chromium-nickel, 4-J, 448-K, 120-L, 127-M, 193-M
chromium-tungsten, transformations of, 147-N
coatings for, 842-L
corrosion resistance of, 76-R
creep of, 279-Q, 678-Q
electrodeposition of, 275-L
embrittlement, hydrogen, 495-R
finishing of, 842-L
fracture strength of, 678-Q
grinding of, 173-G
for high temperatures, 152-V
iron, 278-M, 281-M, 519-P
iron-molybdenum, 430-M
iron-nickel, 159-P, 181-P, 234-P, 95-V
machining of, 173-G
manganese, 133-N
mechanical properties of, 72-H
molybdenum-nickel, 241-M, 430-M
molybdenum-tungsten, 172-L, 857-L
nickel, 281-M, 182-N, 430-P, 519-P, 522-S
platinum, 169-M, 38-N
rhenium, 171-L
silicon, 461-P
sintered, 72-H
stress corrosion cracking of, 495-R
structures, crystal, 382-M
surfacing, hard, 273-L
thorium, 72-H
tungsten, 428-M
tungsten carbide, 110-H, 111-H, 429-M, 366-Q, 13-V
for turbines, gas, 216-T
vanadium, 282-M
welding, resistance, 621-K, 703-K
yield strength of, 678-Q
Cobalt carbide, 30-M
Cobalt carbonitride, 30-M
Cobalt compacts
boron carbide, 4-H
titanium carbide, 4-H
Cobalt electrodeposits
copper, 721-L
nickel, 721-L

Cobalt electrodeposits (cont.)
porosity of, 721-L
Cobalt nitride, 30-M
Cobalt ores,
concentration of, 7-B, 17-B, 173-B
flotation of, 17-B
hydrometallurgy of, 68-C
leaching of, 17-B, 99-B
nickel, 312-B
pyrometallurgy of, 68-C
reduction, chemical, 77-C, 78-C, 79-C, 90-C, 94-C, 100-C, 106-C, 109-C, 109-C, 112-C, 149-C
refining of, 168-C
resources of, 314-A
smelting of, 314-A, 17-B
Cobalt plating, 497-L
nickel, 470-L
Cobalt powder compacts, iron, 67-H
Cobalt powder products, 67-H
Cohesive strength. See Strength properties
Coke, 161-B, 295-B, 296-B
Coke-oven gas, 177-D, 307-D
Cold shortness. See Brittleness, or Toughness
Columbium,
applications of, 23-V, 177-A
cleaning and finishing of, 23-V
coatings, ceramic, 37-V
determination of, 879-Q, 87-S, 338-S, 386-S, 497-S, 533-S
formability of, 23-V
in heat-resisting alloys, 165-V
machinability of, 23-V
magnetic properties of, 176-P
mechanical properties of, 23-V
nitriding of, 131-M
Poisson's ratio of, 879-Q
preparation of, 47-C
processing of, 37-V
pyrophoric properties of, 455-P
shear modulus of, 879-Q
siliconizing of, 950-L
specific heat of, 552-P
in stainless-steel-wire welding, 120-K, 391-S
substitutes for, 313-A
superconducting, 272-P
supply situation, 177-A
weldability of, 23-V
Columbium alloys,
chromium, 61-M
corrosion resistance of, 114-R, 371-R
for metal-nonmetal brazing, 497-K
titanium, 11-M, 257-N
zirconium carbide, 114-H
Columbium ores, 140-B, 304-B, 310-B, 165-V
Columbium ores (cont.)
tantalum, 18-C
Columbium oxides, 16-C, 37-C
Columbium powder, 25-H
Columbium single crystals, 1013-Q
Columbium wires, 131-M
Columns, 757-Q, 763-Q, 778-Q, 830-Q, 850-Q
Combustion
book, 208-B, 351-B
flameless, 62-B
Communications equipment, 915-L
Comparators. See Gages; or Gaging
Compression strength, 358-Q
Conductivity, electrical, 21-P, 45-P, 57-P, 205-P, 284-P, 463-P, 466-P, 472-P, 567-P, 536-P, 749-Q
Conductivity, thermal, 18-P, 64-P, 76-P, 102-P, 246-P, 301-P, 325-P, 335-P, 365-P, 375-P, 437-P, 438-P, 463-P, 575-P
Constantan. See Nickel alloys, copper; or Copper alloys, nickel
Constitution diagrams. See Phase diagrams
Contact potentials, 266-P
Containers, 320-G, 512-L, 551-L, 808-L, 461-T, 568-T, 160-V
Contraction. See Expansion; or Stability, dimensional
Control. See Temperature control; etc.
Controlled atmospheres, 36-J, 74-J
Controllers, 399-S, 400-S, 401-S
Converter process. See Bessemer process
Converters. See Bessemer converters
Copper,
adsorption of oxygen on, 79-P
for aluminum corrosion prevention, 235-R
aluminum as substitute for, 100-T, 101-T, 104-T, 106-T
analysis for, 35-B, 31-S, 61-S, 142-S, 143-S, 311-S, 363-S
annealing of, 104-J, 197-J, 211-Q
annealing textures in, 41-N
annealing furnace for, 182-J
anodizing of, 671-L, 348-R
applications of, 252-R, 99-T, 126-T, 464-T
brazing of, 3-K, 234-K, 718-K
for cast-iron brazing, 477-K
casting properties of, 115-C
cathodic sputtering of, 47-L
centrifugal casting of, 1-E
chromium plating on, 238-L
cladding with lead, 38-L, 544-T
in cladding of steels, 376-L
cleaning of, 190-L, 872-L
coatings for, 39-A, 360-L, 92-N

Copper (cont.)
conductivity
electrical, 131-P, 291-P, 556-P
thermal, 131-P, 536-P
continuous casting of, 294-B, 125-C, 167-C
copper-tin plated, microstructure of speculum, 720-L
core losses in, 394-P
corrosion of, 40-R, 70-R, 99-R, 147-R, 166-P, 231-R, 233-R, 246-R, 249-R, 311-R, 364-R, 388-R, 450-R, 474-R, 509-R
corrosion prevention of, 967-L, 485-R
creep of, 423-Q, 604-Q, 962-Q, 1052-Q
creep strength of Ag-bearing and Ag-free, 10-Q, 484-Q, 897-Q
crystal growth of, 47-N
cutting of, 128-G
deposits on glass, 320-L
desulfurization of, 139-C
determination of carbon in, 142-S
determination of oxygen in, 142-S, 168-S
determination of sulfur in, 142-S
deuteron bombardment of, 211-P
diffraction, x-ray, 93-M
diffusion of aluminum in, 120-N
diffusion of carbon in, 227-N
diffusion in cuprous oxide, 69-N
diffusion into nickel, 30-N
diffusion, self, 102-N, 277-N
diffusion of sulfur in, 227-N
diffusion of zinc in, 120-N
drawing of, 83-F, 480-G, 500-G
ductility of, 613-Q
economic trends, 95-A, 103-A, 115-A, 226-A, 337-A
elastic properties of, 486-Q, 548-Q
elasticity modulus of, 198-Q, 349-Q
electrode potentials, 477-P
electroforming of, 39-L
electrodeposition of, 270-L, 380-L, 653-L, 961-L
electrometallurgy of, 17-B, 24-C, 141-C
electropolishing of, 451-L, 548-L, 954-L
embossing of, 409-T
etching of, 985-L, 38-M
extrusion of, 129-F, 137-F
fatigue testing of, 688-Q
finishing of, 190-L, 872-L
fracture of, 699-Q
free energy, interfacial, 441-P
frictional properties of, 396-Q, 572-Q
government regulations, 187-A
grain orientation, preferred, 211-Q
Hall effect — cold-work effects on, 291-P
hardening, work, 905-Q
hardness of, 233-Q, 1005-Q
hardness testing of, 360-Q
heading of, 103-G
heat ray protection by, 82-P
high-purity, 489-P, 51-Q, 756-Q, 1016-Q 503-R
historical survey of, 333-A
impregnation into carbon, 570-T
inclusions in, 39-C
joining to aluminum, 314-K
magnetic properties of, 150-P
mechanical properties of, 663-K, 144-Q, 246-T
melting of, 107-C, 139-C, 510-E, 412-P
metal transfer to steel during sliding contact, 34-Q
metallurgy of, 172-A, 86-C, 101-C
mining of, 270-A, 321-A, 252-B
nucleation of, 571-E
oxidation of, 451-L, 381-P, 477-P, 265-R, 266-R, 503-R, 530-R
physical properties of, 144-Q, 246-T
plastic properties of, 377-Q
plating, 175-L, 176-L, 177-L, 178-L, 476-P
polishing of, 190-L, 872-L, 937-L
production of, 27-A, 134-A, 203-A, 258-A, 102-C
properties of, 176-Q
radiation absorption in, 341-P, 370-P, 425-P, 426-P
radiation cross-section determination, 269-P, 294-P
reactions with liquids, 231-R
recovery of, 31-R, 136-A, 138-A, 249-A, 278-A, 287-A, 339-A, 93-C
recrystallization in, 39-N, 92-N
refining of, 11-C, 39-C, 43-C, 107-C, 125-C, 139-C, 663-K, 478-T, 32-V
resistivity of, 4-P, 87-P, 563-P
rolling, cold, 247-F, 309-F
shear strength of, 645-Q
shortages of, 252-A
softening point of Ag-bearing and Ag-free, 10-Q, 484-Q, 897-Q
solderability of Pb-Sn plated, 606-K
solubility, acid, nitric, 40-R
solubilizing of, detergents in, 61-R
solution heat in molten tin, 500-P
spectroscopy of, 521-P, 521-S
stainless steel clad on, 629-L, 91-V
statistics for, 155-A, 335-A
strength properties of, 613-Q
stress-strain properties, 905-Q
structure
crystal, 16-M, 252-M, 272-M
deformation, 163-Q
substitutes for, 306-A, 313-A

Copper (cont.)
supply trends, 122-A, 176-A, 310-A
surface tension of, 259-P, 441-P
tensile strength, 905-Q
thermal shock tests for, 246-Q
thermoelectric effect in, 599-P
tin coating of, 214-L
tin-copper plated, 720-L
twinning of, 476-M, 17-N
waste disposal, 60-A
wear resistance of, 973-Q
welding of, 3-K, 99-K, 220-K, 277-K, 304-K, 376-K, 480-K, 622-K, 663-K
working, cold, 291-P, 497-P
Copper alloy castings, 469-E, 498-E, 547-E
Copper alloys. See also Brasses or Bronzes
copper alloys, 85-5-5-5. See Copper alloys, lead-tin-zinc
aluminum, 116-C, 547-E, 18-M, 329-M, 169-N, 209-N, 226-N, 9-P
aluminum-cobalt, 287-M
aluminum-iron, 287-M
aluminum-iron-copper, 438-Q
aluminum-iron-nickel, 438-Q
aluminum-magnesium, 46-M, 260-M
aluminum-manganese, 287-M
aluminum-nickel, 287-M
aluminum-zinc, 257-M
analysis of, 26-S, 100-S, 222-S
antimony, 206-M, 9-P, 489-P
antimony-lead-zinc, 308-E, 311-E
application of, 122-P, 333-R, 180-T, 276-T
arsenic, 9-P, 108-P, 489-P, 529-Q
beryllium
analysis of beryllium in, 339-S
applications of, 137-E, 179-G, 380-M, 554-T, 172-V, 184-V
conductivity, electrical, 459-Q
corrosion resistance of, 16-L
die casting of, 248-T
for die-casting dies, 514-E
drawing, 91-F
electrical conductivity of, 602-Q
electroplating of, 16-L
engineering properties of, 79-V
frictional properties vs. hardness, 573-Q
heat treatment of, 16-F, 91-F
investment casting in, 467-E
joining, 91-F
machining of, 352-G
mechanical properties of, 380-M, 459-Q, 172-V, 184-V
microstructures of, 380-M
molds for, 655-E, 248-T

Copper alloys (cont.)
beryllium (cont.)
phase diagrams of, 380-M, 172-V, 184-V
physical properties of, 172-V, 184-V
pickling of, 16-L
plastic deformation of, 573-Q
plating of, 91-F
precipitation in, 79-N
properties of, 374-Q, 399-Q
in springs, 347-T
tension tests on, 602-Q
beryllium-tin, 144-N
bismuth, 206-M
brazing of, 740-K
cadmium, 178-M, 489-P, 459-Q
cadmium-silver, 459-Q
casting of, 569-E, 943-Q, 992-Q, 461-S
chromium, 188-N, 459-Q, 327-S
classification of, 82-A
coatings for, 403-L
cobalt, 9-P
cobalt-zinc, 287-M
composition of, 208-G
conductivity,
electrical, 183-P
thermal, 206-P
corrosion of, 8-R, 414-R, 479-R
creep of, 279-Q
degassing, 263-E
in design, 194-V
dezincification of, 414-R, 479-R
die caster for, 417-E
die casting of, 118-E, 158-E, 399-E
extrusion of, 943-Q, 992-Q
forging of, 943-Q, 992-Q
forming of, 269-G, 304-G
foundry practice — book, 600-E
gallium, phase diagrams of, 191-M, 329-M
gating systems for, 530-E
germanium, 406-M, 529-Q
germanium-zinc, 159-M
gold, 947-L, 78-M, 208-M, 84-N, 152-N, 215-N, 256-N, 285-N, 548-P, 313-Q, 347-Q, 500-Q, 358-T
gold-silver, 345-P
heat treatment of — furnaces for, 77-J, 242-J
indium, 392-M
inhibit setting of carbinol glues, 782-K
for investment castings, 18-E
iron, 9-P, 206-P, 489-P, 915-Q
iron-nickel, 59-M, 332-P, 382-R, 418-R
iron-zinc, 287-M
lead, 395-E, 403-L, 33-M, 63-M, 489-P, 267-Q, 89-T, 113-T, 219-T
lead-tin, 238-R, 336-R
lead-tin-zinc, 530-E, 33-M, 88-Q, 428-Q

Copper alloys (cont.)
lead-zinc, 176-T
lithium in refining of, 140-C
machining of, 258-G, 943-Q, 992-Q
magnesium, 70-M, 9-P
magnesium-zinc, 297-M
manganese, 343-M, 270-N, 9-P
manganese-silicon, 233-J
manganese-tin, 410-M
manganese-zinc, 287-M
mechanical properties of, 183-P
microstructure of, 183-P
nickel,
aging of, 939-Q
brazing of, 39-V
cladding with, 134-L
conductivity, electrical, 9-P, 489-P
corrosion of, 159-R, 378-R
corrosion inhibitors for, 64-R
diffusion in, 41-H, 252-N, 258-N, 316-N
drawing of, 939-Q
electrical properties of, 226-P
gating systems for, 523-E
hardening, work, 905-Q
heat treatment of, 39-V, 939-Q
homogeneity of sintered, 467-M
magnetic properties of, 226-P, 403-P
microstructure of, 274-M
properties of, 39-V
resistivity of, 9-P, 367-P
sintering of, 41-H
soldering of, 39-V, 86-P
solidification of, 523-E
stress-strain properties of, 905-Q
structure, crystal, 451-M, 453-M
structures, deformation 939-Q
tensile strength of, 905-Q
Volta potentials of, 88-P
welding of, 319-K, 690-K, 39-V
nickel-magnesium, 71-M
nickel-plated, 180-L
nickel-silicon, 459-Q
nickel-zinc, 821-L, 838-L, 287-M, 464-Q, 170-R
oxidation of, 414-R, 479-R
palladium, 316-N
phosphorus, 9-P, 489-P, 612-Q, 613-Q
platinum, 90-N, 413-P, 500-R
processing of, 107-C
properties of, 208-G
refining of, 92-C, 140-C
silicon, 17-G, 9-P, 489-P, 529-Q, 985-Q
silver, 329-M, 489-P, 97-Q, 347-Q, 459-Q, 460-Q
solidification of, 530-E
stress corrosion of, 414-R, 479-R, 480-R
tarnishing of, 479-R, 414-R
tensile strength of, 978-Q

Copper Alloys (cont.)
tin, 15-C, 547-E, 33-M, 20-N, 209-N, 226-N, 580-Q, 1047-Q, 144-R, 344-R. See also Bronzes
tin-zinc, 159-R
titanium, 256-M, 284-M, 9-P
wear resistance of, 978-Q
welding of, 4-K, 220-K, 388-K
workability of, 943-Q, 991-Q
working, cold, 385-G
zinc, 547-E, 134-L, 368-L, 33-M, 431-M, 98-N, 256-N, 293-N, 529-Q, 739-Q, 64-R, 170-R. See also Brasses
Copper and alloys, 84-V
annealing of, 79-J, 242-J
bending of, 485-G
brazing of, 103-K, 538-K, 637-K
chromating of, 852-L
classification of — book, 94-A
coating of, 424-L
corrosion of, 44-R, 402-R
creep of, 859-Q, 938-Q
electropolishing of, 777-L
fabrication of, 48-V, 57-V
finishing of, 48-V, 57-V
grain refinement in, 439-E
heat treatment of, 485-G
mechanical properties of, 485-G, 919-Q, 922-Q
oxidation, high-temperature, 49-R
physical properties of, 485-G
pickling baths for, 972-L
properties of, 48-V, 57-V
soldering of — book, 538-K
specifications for, 266-S, 311-S, 315-S, 367-S
tensile strength of, 617-Q
in tubemaking, 186-F
wear resistance of, 183-Q, 942-Q
welding of, 485-G, 103-K, 319-K, 538-K, 637-K
Copper amalgam, 311-R
Copper anodes, 309-L
Copper bars, 160-C
Copper castings, 523-E, 571-E, 449-G, 849-L
Copper cathodes, 554-P
Copper coatings, 560-L, 764-L, 490-R
Copper couples, aluminum, 312-P
Copper die castings, 118-E, 559-T
Copper electrodes, 476-P, 233-R, 537-R
Copper electrodeposits,
antimony, 206-M
bismuth, 206-M
on brass, beta-phase, 226-M
chromating of, 852-L
chromium, 600-L
coatings, lacquer, 504-L

Copper electrodeposits (cont.)
cobalt, 721-L
growth of, 153-L, 530-L
nickel, 721-L
polishing of, 160-L
reflectivity of, 964-L
structure, crystal, 955-L, 965-L
wear resistance of, 413-L
on zinc single crystals, 413-Q
Copper extrusions, 41-F
Copper films, 585-P
Copper forgings, 41-F
Copper industry, 321-A
Copper-iron couple, 364-R
Copper mattes, 111-C
Copper-nickel couples, 228-N
Copper ores,
antimony-lead-tin, 76-C
classification of, 294-B
concentration of, 49-A, 7-B, 17-B, 93-B, 128-B, 156-B, 233-B
crushing and grinding of, 233-B, 294-B
flotation of, 16-A, 17-B, 110-B, 181-B, 233-B, 294-B, 306-B
gold-lead-silver-zinc, 58-B
leaching of, 17-B, 194-B
lead-zinc, 314-B
molybdenum recovery from, 110-B
reduction of, 294-B, 28-C, 75-C, 77-C, 78-C, 79-C, 90-C, 94-C, 100-C, 106-C, 109-C, 112-C, 138-C, 149-C
refining of, 49-A, 125-C
separation of, 14-B, 93-B
smelting of, 49-A, 17-B, 263-B, 24-C, 43-C, 44-C, 51-C, 74-C, 111-C, 169-C, 663-K, 478-T
thickening of, 294-B
Copper oxides, 64-C, 75-C, 138-C, 176-M
Copper pipes, 50-R, 405-R
Copper — plastic bonding, 357-T
Copper plates, 120-R, 478-T
Copper plating, 673-L
addition agents in, 660-L
air agitation in, 42-L
on aluminum and alloys, 414-L, 723-L
antimony, 206-M
bismuth, 206-M
bright, 932-L
cadmium, 717-L
cathode polarization potential in, 965-L
electrolytic regeneration cell, 924-L
on iron single crystals, 626-L
periodic-reverse, 427-L, 869-L, 931-L
solutions for, 445-L
of steels, 138-J, 297-T
tin, of speculum, 719-L
of textile fabric, 199-R, 200-R
of zinc alloys, 155-L
on zinc die castings, 925-L
Copper powders, 20-H, 49-H, 106-H, 109-H, 128-H, 176-R, 177-R, 514-T
Copper powder compacts,
aluminum, 48-H
iron, 47-H
nickel, 21-H
tellurium, 34-H
Copper powder products,
aluminum, 48-H
conductivity, electrical, 53-P
iron, 7-H, 9-H, 323-T
production of, 49-H
properties of, 356-Q
tin, 580-Q
zinc, 51-H
Copper pressure vessels, 51-K
Copper salts, 53-C
Copper scrap, 191-A, 13-C, 77-C, 78-C, 79-C, 90-C, 94-C, 100-C, 106-C, 109-C, 112-C, 149-C
Copper sheets, 12-G, 301-T, 312-T, 410-T
Copper single crystals, 362-M, 319-Q, 320-Q, 407-Q, 575-Q, 1005-Q
Copper smelters, 74-C, 31-R
Copper spheres, 181-M
Copper — stainless-steel laminates, 709-K
Copper steels. See Steels, alloy, copper; or Stainless steels, copper
Copper strip, 131-F, 160-F, 112-H
Copper stripping baths, 360-A
Copper tubing, 21-F, 76-F, 129-F, 137-F, 183-F, 206-J, 455-K, 791-K, 432-T
Copper welds, 480-K, 663-K
Copper wires,
annealing of, 10-J
chromium-iron, 33-Q
conductivity, electrical, 300-Q
diffusion, self, 324-N
drawing of, 597-P
electrical properties of, 68-P, 398-Q
fabrication of, 48-F
inhomogeneity effects in, 599-P
iron, 33-Q
mechanical properties of, 555-P
physical properties of, 555-P
plastic deformation of, 159-Q, 795-Q
platinum, 58-P
recrystallization of, 143-N, 211-N
resistivity of, 265-N, 366-P, 597-P
silver, 33-Q
solutions for drawing, 318-F
specifications for, 310-S
structure, crystal, 68-P
tensile strength of, 398-Q
tin coatings on, 24-L, 973-L
tin plating of, 827-L
tinning, electrolytic, 647-L
vaporization by electrical discharge, 346-P

Copper wires (cont.)
zinc-ion adsorption by, 311-P
Copper-zinc couples, 240-N
Coremaking, 618-E
Cores. See Foundry cores
Corrosion. See also Corrosion resistance; Oxidation; Scaling
Corrosion, 223-M, 129-R, 264-R, 373-R
acid, 14-R, 44-R, 397-R
atmospheric, 81-R, 118-R, 515-R
book, 33-R, 483-R
brine. See Corrosion, sea-water
cavitation — accelerated testing, 468-R
chemical, 4-R, 44-R, 232-R, 345-R, 417-R, 425-R, 345-R
in chemical industry, 123-R
concentration-cell. See Corrosion, galvanic
costs of, 254-R, 255-R
design for prevention of, 508-T
electrical nature of, 180-R
electrochemical vs. chemical, 417-R
electrochemical mechanism of, 78-R
electrolytic. See Corrosion, galvanic
factors in, 392-R
fluorine and compounds, 420-R
fretting, 148-R, 272-R, 305-R, 346-R, 413-R, 484-R
galvanic, 364-P, 227-R, 300-R, 324-R, 440-R, 545-R. See also Corrosion, electrochemical.
gaseous, 427-R
industrial problems in, 342-R
intergranular, 389-R, 390-R
of ion-exchange systems, 306-R
lubricant, 559-Q, 429-R
marine, 455-R
mechanism of, 22-R, 276-R
by microörganisms, 83-R
microstructure relationship to, 244-R
oxide-film effects, 451-R
oxygen, 260-R
in paper and pulp mills, 117-R
phase-diagram significance in, 28-R
physical metallurgy of, 78-R
of power generation equipment, 493-R
prevention of, 209-B, 255-R, 118-R, 129-R, 531-R
research on, 293-A, 258-R
review on, 154-R, 186-R
sea water, 133-R, 544-R
in sewage — treatment plants, 524-R, 525-R
soil, 118-R
of space-heating equipment, gas-fired, 343-R, 428-R
Corrosion (cont.)
in steel industry, 374-R, 491-R
stray-current, 307-R
stress. See Stress corrosion
structure effects on, 292-T
surface-active-agent effects, 298-R
tables of metals attacked — book, 377-R
thermodynamics of, 78-R
water, 65-R, 140-R, 153-R, 226-R, 269-R, 302-R, 316-R, 322-R, 403-R, 469-R. See also Corrosion, sea water.
Corrosion fatigue, 902-Q, 515-R
Corrosion inhibitors, 22-R, 34-P, 126-R, 275-R, 385-R, 440-R
for automobile radiators, 252-R
for boilers, 405-R
for brine drippings, 106-R
chromates as, 396-R, 407-R
for copper in nitric acid, 474-R
in engine lubricants, 56-R
for ferrous metals, 48-R, 87-R
for iron, 313-R
mechanism of, 149-R, 267-R
oils, rust-preventive, 293-R
organic, 404-R
in packaging materials, 317-R, 365-R
for petroleum-refining equipment, 161-R, 165-R, 404-R
phosphates, 282-R
semipolar, 104-R
for steels, 47-R, 172-R, 347-R
vapor-phase, 478-R
for water systems, 400-R, 401-R, 405-R, 406-R
Corrosion prevention, 158-L, 71-R, 156-R, 192-R, 253-R, 256-R, 281-R, 341-R, 363-R, 378-R, 400-R, 401-R, 419-R, 473-R, 497-R, 522-R
Corrosion-preventive coatings. See Coatings, corrosion-preventive
Corrosion promoters, 275-R
Corrosion resistance, 97-Q, 94-R, 487-R
Corrosion-resisting alloys, 247-Q
applications of, 97-R, 98-R, 283-R, 400-R, 415-R, 420-R, 425-R, 540-R, 271-T, 507-T
coatings, paint, 455-R
in design, 194-V
machinability of, 376-G
mechanical properties of, 475-R
melting, induction, 490-E
nonferrous, 99-V
selection of, 11-S
wear of, 639-Q
Corrosion testing, 2-R, 7-R, 107-R, 145-R, 150-R, 155-R, 257-R, 320-R, 381-R, 388-R, 412-R, 436-R, 444-R, 454-R, 470-R, 60-S

Corrosion testing (cont.)
book, 202-R, 482-R, 483-R
Couplings, 933-Q
Cracking, intercrystalline, 886-Q
Cracking, season. See Stress corrosion
Cracks. See Failures
Creep. See also Creep strength
Creep, 15-Q, 66-Q, 155-Q, 294-Q, 363-Q, 510-Q, 523-Q, 669-Q, 717-Q, 800-Q, 855-Q, 50-R
of austenitic alloys — cold-working effects, 637-Q
crystal-structure dependence, 859-Q, 938-Q
during interrupted stress, 847-Q
at low temperatures, 462-Q
mechanism of, 503-Q
melting-point dependence, 859-Q, 938-Q
research methods, 634-Q
residual-stress effects, 749-Q
of solids, 807-Q
strain-hardening and softening effects on, 655-Q
Creep-resisting materials, 155-Q
Creep strength. See also Creep
Creep strength, 106-Q, 125-Q, 774-Q, 779-Q, 923-Q, 292-T
Creep testing, 156-Q, 206-Q, 276-Q, 371-Q, 510-Q, 743-Q, 782-Q, 840-Q, 949-Q
Crucibles, 284-B, 303-B, 179-D, 586-E
Crushing and grinding, 15-B, 41-B, 63-B, 217-B, 223-B, 245-B, 319-B, 330-B, 348-B
ball mill, 321-B
equipment for, 30-B, 86-B, 319-B, 322-B, 330-B
of hard ores, 243-B
mills, hammer, 325-B
statistical mechanics of, 336-B
Cryoscopy, 50-C
Crystals. See also Metal single crystals
breaking strength of, 977-Q
disintegration of mixed, 237-N
displacement structures in, 301-Q
diffusion in, 354-M
growth of, 242-M, 112-N, 184-N, 213-N, 281-N. See also Single crystals, metallic
single, 400-M, 403-M, 309-Q, 322-Q. See also Single crystals, metallic.
spherical, 338-M
stereographic plots of, 463-M
transformations, allotropic, 156-N
X-ray analysis of — book, 446-M
Crystal structures. See Structures, crystal
Crystallization. See also Recrystallization
Crystallization, 153-N
Crystallography, x-ray, 369-M, 370-M, 371-M, 372-M, 373-M, 374-M, 375-M, 376-M, 377-M, 418-M
Cupola furnaces, 379-E, 563-E
air-gun patching of, 47-E
air preheater for, 2-E
basic, 8-E, 58-E
Belgian blast furnace, 313-E
charge-level indicator for, 536-E
charging equipment, mechanized, 9-E, 39-E, 341-E
combustion processes in, 635-E
control and instrumentation of, 591-E
design of, 306-E, 356-E
dust and spark arresters in, 237-E
in Germany, 356-E
hot-blast, 263-D, 88-E, 338-E, 356-E
improvements in, 267-E
linings for, 159-E, 183-E, 184-E, 378-E, 421-E, 483-E
pressurized, 152-E
refractories for, 28-E, 303-E, 413-E, 474-E
repair of — jet process, 580-E
tuyeres for, 540-E, 640-E
water-cooled, 124-E, 159-E
Cupola practice, 263-D, 46-E, 58-E, 115-E, 243-E, 348-E, 411-E
basic, 78-E, 130-E, 306-E, 320-E
blast-furnace gas utilization in, 44-E
Boudonard equilibruim in, 635-E
coke for, 212-E, 380-E, 615-E
coke ash-content effects, 295-B
combined with converting and electric steelmaking, 238-D
defect factors, 20-E
deoxidation in, 631-E
effect on tensile strength of gray iron, 389-Q
fuels for, 261-B, 295-B
hot-blast, 264-D
lining burn-out in, 124-E
melting in, 147-E, 163-E
oxygen in, 46-E
purification of fumes from, 316-A
raw materials for, 200-E, 358-E, 407-E, 437-E, 643-E
reclaiming cast-iron borings in, 438-E
scrap utilization in, 565-E
swarf melting in, 261-E, 317-E, 318-E, 325-E, 362-E, 373-E, 404-E, 473-E
temperature measurement in, 591-E
Cupronickel, 121-C
Curie point, 106-P
Cutting, 47-G, 48-G, 334-G, 520-G

Cutting fluids, 5-G, 72-G, 84-G, 85-G, 86-G, 88-G, 106-G, 109-G, 112-G, 118-G, 127-G, 133-G, 139-G, 151-G, 258-G, 331-G, 444-G, 468-G
affinity for metal surfaces, 196-G
antirust qualities of, 196-G
designations of, 471-G
evaluation of, 498-G
for grinding, 110-G
heat-transfer properties of, 409-G
for machining, 389-G
machining effects, 27-G
mechanism of action, 47-G
selection and application, 75-G
for stainless-steel machining, 390-G
Cutting tools. See Tools, cutting
Cyanidation, 126-C
Cyanide wastes, 6-A, 39-A, 42-A, 43-A
Cyclone separators, 98-B, 105-B, 106-B
Czechoslovakia,
mineral resources of, 292-B
steel industry of, 292-B

Debye-Scherrer method. See Radiography, X-ray
De-enamelling, 346-L
Deep drawing. See Drawing, deep
Defect detection. See Nondestructive testing; Inspection; Radiography
Deformability. See Plastic properties
Deformation,
theory of — book, 495-Q
Deformation, elastic. See Elastic properties
Deformation, plastic. See Plastic properties; or Plastic deformation
Deformation structures. See Structures, deformation
Degasification, 32-P
Degreasing. See also Cleaning, chemical
Degreasing, 15-L, 55-L, 116-L, 363-L, 369-L, 798-L, 802-L
Dental materials, 134-J, 199-T, 237-T
Descaling. See also Pickling
Descaling, 194-L, 196-L
Design, 474-G, 512-R
Detergents, 657-L
Diamonds, 28-B, 156-M
Dichromating. See Chromating
Dies,
blanking, 402-G
carbide. See Carbide dies
cast irons for, 937-Q
cutting, 73-G
design of, 181-G
die-casting, 34-E, 49-E, 247-E, 365-E, 442-E, 514-E, 575-E, 976-L, 265-Q
Dies (cont.)
drawing, 176-F, 177-F, 178-F, 179-F, 211-G, 236-G, 281-S. See also Dies, wire-drawing
drop-hammer, 608-E
extrusion, 179-F
forging, 74-F, 225-J, 836-L, 871-L, 976-L, 454-T
forming, 105-E, 114-E, 123-E, 54-G, 287-G, 305-G, 411-G, 427-G, 75-L, 17-T
hobbing, 60-G
lubricants for, 444-E, 88-F, 512-G
metalworking, 454-T
plastic molding, 39-T
stamping, 454-T
wire-drawing, 24-F, 38-F, 86-F, 216-F, 254-F, 271-F, 50-Q, 54-S
zinc alloys for, 339-G
Die castings, 145-E, 446-E, 8-H, 195-K, 141-L, 232-L, 509-L, 580-L, 634-L, 930-Q, 298-T
Die casting dies. See Dies, die-casting
Die-casting process, 5-E, 25-E, 38-E, 43-E, 51-E, 141-E, 158-E, 166-E, 188-E, 205-E, 218-E, 281-E, 283-E, 399-E, 403-E, 419-E, 482-E, 79-G, 9-H
bibliography of, 186-E, 330-E
book, 517-E
equipment for, 49-E, 208-E, 284-E, 285-E, 360-E, 389-E, 573-E
Die steels. See Toolsteels
Diesel engines. See also Engines, automobile; Engines, internal-combustion; Locomotives
Diesel engines, 160-E, 75-T, 89-T, 114-T, 511-T, 512-T
Diffraction, 375-M, 258-N
electron, 68-M, 73-M, 198-M, 203-M, 208-M, 229-M, 440-M
x-ray, 93-M, 144-M, 339-M, 260-S
in analysis, quantitative, 439-S
camera for, 240-M, 305-M, 306-M, 381-M, 478-M, 439-S
cold-work and particle-size effects, 214-M
Fourier calculations, 371-M
interpretation of photographs, 224-M
for large specimens, 306-M
in metallurgy, 42-M
stroboscopic effect in, 249-M
in structure studies, 143-M, 272-M, 299-M, 389-M, 437-M, 438-M, 441-S
wire-form anticathodes for, 404-M
Diffusion,
book, 163-N
cathodic sputtering in study of, 117-N
electron-microscope study of, 318-M
gas-metal, 266-N

Diffusion (cont.)
grain boundary, 30-N, 125-N, 132-N, 231-N, 264-N
in metals and alloys, 42-N, 195-N, 229-N, 230-N, 231-N, 268-N
relation to porosity, 380-L, 59-N
during sintering process, 106-H
solid-state, 8-N, 252-N, 259-N, 260-N, 261-N, 262-N, 263-N, 265-N
solid-state — book, 283-N
spectrographic study of, 390-S
surface, 264-N
Diffusion coefficients, 126-Q
Dilatometry. See Expansion, thermal; Stability, dimensional
Dip coatings. See Coatings, dip
Dipping, bright. See Cleaning, chemical
Dissolution. See Corrosion
Distillation, 7-C
Domain structures. See Structures, magnetic
Drawing. See also Wire drawing
Drawing, 162-F, 163-G, 462-G, 497-G
deep, 270-G, 302-G, 310-G, 348-G, 355-G, 397-G, 579-L
Drawing dies. See Dies, drawing
Drilling, carbide trepanning for, 198-G, 216-G, 286-G
Drilling and reaming, 6-G, 83-G, 125-G, 193-G, 198-G, 204-G
book, 492-G
Drills, twist, 419-T
Drop forging. See Forging, drop
Drums. See Containers
Drying,
infrared, 87-L
Ductile iron. See Cast iron, nodular
Duralumin. See Aluminum alloys, copper-magnesium; or Aluminum alloys, copper-magnesium-manganese
Durimet. See Steels, alloy, chromium-copper-nickel
Dysprosium,
expansion, thermal, 411-M

Economic survey
of raw material resources in U.S., 342-A
Elastic properties, 46-P, 137-Q, 268-Q, 275-Q, 486-Q, 495-Q, 547-Q, 548-Q, 562-Q, 621-Q, 794-Q, 879-Q
Elasticity modulus, 71-Q, 108-A, 809-Q, 831-Q
Electric brazing. See Brazing, induction; or Brazing, resistance
Electric furnaces, 287-D
advantages over gas furnaces, 398-E, 1-T
Electric furnaces (cont.)
aluminum coatings for electrodes, 256-D
bottom ramming materials for, 147-D
for carbide sintering, 5-H
electrodes for, 136-C, 466-T
for melting metals, 376-E, 381-E
power requirements, 120-C
refractories for, 21-B, 309-B, 227-D, 228-D, 275-D, 96-E, 185-E
for steelmaking, 14-D, 16-D, 63-D, 65-D, 180-D, 182-D, 256-D, 275-D, 331-D, 339-D
temperature measurement and control, 73-S
Electric motors. See Electrical equipment
Electric soldering. See Soldering
Electric steelmaking, 270-D
acid, 133-D
basic, 20-D
book, 275-D, 310-D
coal briquettes for, 317-B
combined with cupola and converter processes, 238-D
desulfurization, carbide, 218-D
equipment at A. Finkl & Sons' Co., Chicago, 272-D
at Marcelo Steel Corp., Manila, 332-D
oxygen in, 227-D, 231-D
quality control in, 330-D
for steel castings, 357-E
Electric welding. See Welding, arc; Welding, resistance
Electrical circuits, 409-T
Electrical conductors. See also Wires
Electrical conductors, 235-R, 472-T
Electrical contacts, 55-P, 139-P, 844-Q, 144-T
Electrical equipment, 462-G, 584-K, 585-K, 130-T
aluminum in, 246-F, 399-P, 156-T, 251-T, 309-T, 317-T, 380-T, 381-T, 382-T, 391-T, 464-T
cable connectors, 702-K
coatings for, 564-L, 620-L, 880-L
copper in, 464-T
core materials for transformers, 328-P, 504-P, 540-T
corrosion prevention of, 292-R
die casting of Al-alloy connectors, 53-E
fastening materials for, 561-K
iron powder products in, 341-T
lead alloys for cables, 415-T
spraying, metal, 617-L
resistor production, 387-P, 528-T
standards for, 532-S
in steel mills, 87-F
structural design of, 187-T
titanium-titanium dioxide rectifiers, 462-T, 515-T

Electrical equipment (cont.)
welding of motor housings, 712-K
wire drawing in manufacture of, 83-F
Electrical properties,
of nonmetals, 20-P
Electrical resistance. See Resistivity
Electrical-resistance alloys, 335-S, 118-T, 144-T
Electrochemical corrosion. See Corrosion, electrochemical; Corrosion, galvanic; or Corrosion, chemical
Electrochemical industry. See also Electrometallurgy
Electrochemical industry, 946-L
book, 119-P
Electrochemistry, 2-P, 313-P, 317-P, 318-P, 319-P, 320-P, 321-P, 323-P, 360-P, 364-P
Electrodes. See also Welding, electrodes for
electrochemical, 385-P. See also Anodes
electric-furnace, 133-C, 466-T
fabrication from foil or strip, 280-S
graphite
titanium-titanium carbide coated, 58-C
materials for high temperatures, 284-B
passivation of metallic, 323-P
Electrode potentials. See also Overvoltage
Electrode potentials, 280-P, 283-P, 311-P, 320-P, 382-P
Electrodes, welding. See Welding, electrodes for; or Welding, rods for
Electrodeposits,
adhesion testing of, 473-L, 681-L, 726-L, 779-L
on chemical equipment, 807-L
coatings, lacquer, 504-L
for corrosion prevention — book, 610-L
diffraction, electron, 203-M
nondestructive testing of, 529-S
rinsing of plated articles, 832-L
specifications for, 726-L
stress analysis, strain-gage, 785-Q
stripping of, 150-L
structure of, 384-L
surface behavior, effect on, 180-L
testing of, 556-L, 726-L, 788-Q
thickness determination of, 726-L, 232-S
Electrodeposition, 221-L, 284-L, 344-L, 428-L, 556-L, 359-P
acidity change of catholyte during, 396-L
American and British methods, 828-L
anode-shape effects, 813-L
apparatus for investigation of, 484-L
book, 73-L, 74-L
bright — book, 522-L
British job shop, 797-L
Electrodeposition (cont.)
cathode-distribution criteria, 499-L
cathode-material effects, 547-L
chelating agents in, 334-L
for chemical-equipment finishing, 807-L
chromic acid recovery from 84-A
diaphragm for plating-solution flow, 51-L
dragout control in, 146-L
Electroplaters Annual Convention (39th), 664-L
equipment for, 147-L, 746-L
lacquers for reinforcements in, 217-L
for leveling, 544-L
maintenance of electrical installations in, 306-L
of metal powders, 38-H
method with alternating current, 875-L
National Bureau of Standards research, 49-L
overvoltage — bibliography on, 683-L
on plastics, 107-L
polarization in, 683-L, 384-P
radioactive tracer study of, 292-S
reports on, 522-L
solutions for, 556-L, 569-L
surface preparation for, 55-L
surface-tension control in, 855-L
Electroforming, 39-L, 170-L, 173-L, 274-L, 332-L, 339-L, 392-L, 488-L
Electrolytic corrosion. See Corrosion, galvanic
Electrolytic processes, 175-L, 281-P, 376-R
Electrometallurgy, 50-C, 946-L
Electron diffraction. See Diffraction, electron
Electron emitters, 104-M
Electron microscopes, 29-M, 201-M, 225-M
Electron microscopy. See Microscopy, electron
Electronics equipment,
aluminum-clad sheets for, 314-T
book, 214-S
chromium-copper wire in, 335-S
coatings, plastic, 880-L
germanium in, 408-P, 473-P, 520-T, 569-T
magnesium die castings for portable, 427-T
metal-plastic sheets for, 314-T
photoelectric-cell cathode materials, 36-T
in the steel industry, 78-S
tube fabrication, 57-A

Electronic tubes, 708-K, 35-Q, 335-S, 115-T, 389-T
Electroplating. See Electrodeposition
Electroplating baths. See Plating, baths
Electropolished surfaces. See Surfaces, electropolished
Electropolishing, 74-L, 104-L, 382-L, 423-L, 490-L, 522-L, 584-L, 634-L, 865-L, 898-L, 948-L
Electrostatic-spray coatings. See Coatings, electrostatic-spray
Embossing, 409-T
Embrittlement. See also Brittleness; Temper brittleness; Toughness
Embrittlement, 620-Q, 827-Q
Embrittlement, intergranular. See Corrosion, intergranular
Emissivity, thermal, 184-A, 120-P, 212-P, 323-S
Enamels, porcelain, 881-L
  adherence of, 102-L, 447-L
  corrosion resistance of, 131-L
  defects in, 952-L
  flaw detection in, 134-S
  islanding of, 131-L
  luminescent, 532-L, 889-L
  specifications for, 4-L
  spraying of, 688-L
  for steels, 162-L, 168-L, 239-L, 308-L, 390-L, 554-L, 729-L
  testing of, 951-L
  wear resistance of, 102-L
Enameling, 297-L, 299-L, 371-L
Enameling, porcelain, 22-L, 535-L, 613-L, 792-L
  Athens Stove Works, Athens, Tenn. 553-L
  atmospheric pollution from, 9-A
  book, 121-L
  cobalt in — radioactive tracer study of, 501-L, 543-L, 554-L, 558-L, 638-L
  conservation in, 77-L
  control of, 602-L
  fishscale defect in, 53-L, 124-L
  of hollow ware, 514-L
  of iron television-pictire-tube-cones, 20-T
  nickel in, 304-L, 859-L
  spray process, 37-L, 552-L
  of steel sheets, 689-L
Energy. See Thermodynamic properties
Engines,
  aircraft, 511-Q, 51-S, 209-T, 273-T, 295-T, 355-T, 461-T
  aluminum in, 140-T, 458-T
  automobile, 491-L, 56-R, 173-T
  chromium plating of, 738-L
  coatings, sprayed-metal, 816-L
  corrosion of, 62-R
Engines (cont.)
  diesel, 452-K, 488-Q, 316-R, 457-T
  internal-combustion, 596-E, 70-K, 706-K, 774-L, 429-R, 13-T, 431-T
  jet,
    ceramic-metal combinations for, 35-Q
    coatings, ceramic, 1-L, 10-L, 550-L, 701-L, 909-L
    copper-clad stainless steel for, 629-L, 497-Q, 301-T
    fabrication of, 441-G
    forming of Inconel and stainless steel, 416-G, 423-G
    grinding, abrasive, 282-G
    inspection of, 373-S
    machining in fabrication of, 234-G, 319-G, 342-G
    materials for, 118-H, 496-Q, 935-Q, 362-T, 431-T, 502-T, 545-T
    presswork in production of, 410-G
    refractories for, 284-B
    stamping of parts for, 281-G
    tumbling of precision parts, 772-L
    welding of, 416-G, 423-G, 442-K, 665-K
  stainless-steel thread inserts in, 458-T
  wear in, 626-Q, 810-Q, 972-Q, 543-R
Engineering,
  fundamentals of — book, 269-A
  materials of construction in — book, 403-Q
Enthalpy. See Specific heat
Equilibrium diagrams. See Phase diagrams
Erosion corrosion. See Corrosion, fretting
Erosion resistance. See Wear resistance
Erosion testing. See Wear testing
Etching, electrolytic. See Electropolishing
Eutectoid reactions, 14-N
Expansion, thermal. See also Stability, dimensional
Expansion, thermal, 77-P, 463-P, 965-P
Explosion testing. See Fracture testing
Exposure testing. See Corrosion testing
Extrusion, 129-F, 137-F, 142-F
  bending of high-strength, 373-G
  cold, 301-A, 35-F, 183-F, 362-G, 497-G
  of complex shapes, 221-F
  hot, with fiberglass lubricant, 130-F, 171-F, 198-F, 205-F, 208-F, 228-F, 497-G
  lubricants for, 162-F, 221-F
  plastic deformation in, 929-Q
Extrusion dies. See Dies, extrusion

Fabrication, 117-A, 293-A, 37-F, 146-K
Facing, hard. See Surfacing, hard

Failures, 69-Q, 711-Q. See also Fractures
Fasteners, 692-K, 702-K, 842-L, 340-T
Fasteners, bolt. See Bolts and nuts
Fasteners, rivet. See Rivets
Fatigue, 69-Q, 227-Q, 472-Q, 593-Q
  book, 746-Q
Fatigue, corrosion. See Corrosion fatigue
Fatigue strength, 277-Q, 365-Q, 634-Q, 749-Q, 926-Q, 948-Q
Fatigue testing, 206-Q, 689-Q, 690-Q
  at British Welding Research Assn, 853-Q
  with cathode ray oscillography, 969-Q
  deformation during, 865-Q
  Dilastrain method, 157-Q
  equipment for, 230-Q, 236-Q, 452-Q, 491-Q, 659-Q, 822-Q, 864-Q, 980-Q, 1069-Q
  at high temperatures, 902-Q
  with increasing loads, 133-Q
  of joints, bolted, 464-S
  notch effects, 656-Q
  size effects in, 841-Q
Ferrites, 181-P
Ferroalloys, 95-A, 288-A, 141-B, 206-B, 264-S, 73-V
Ferrochromium, 293-B, 24-R, 449-R
Ferrochromium-silicon, 92-D
Ferrocobalt, 323-N
Ferromagnetic materials. See also Permanent-magnet materials
  anelasticity of, 976-Q
  book, 33-P
  elasticity modulus of, 51-P
  energy relations in, 601-P
  internal field in, 19-P
  magnetic after-effect of, 100-P
  magnetoelectric properties of, 484-P
  magnetostrictive properties, 51-P, 430-P
  neutron scattering and polarization by, 50-P
  permeability, magnetic, 51-P, 356-P
  plastic deformation of, 976-Q
  properties of, 230-P, 262-P
  resonance in, 19-P
  saturation magnetism in, 537-P
  theory of single-domain particles, 257-P
  ultrasonic generation by, 196-P
Ferromagnetic properties. See also Magnetic properties
  of metals and alloys — book, 474-P
Ferromagnetism, 103-P, 496-P, 601-P
Ferromanganese, 107-B, 126-B, 280-B, 357-B, 113-K
Ferromanganophosphorus, 265-D
Ferronickel, 8-C, 323-N, 340-P
Ferrosilicon, 264-B, 120-C, 406-E, 53-H, 1-N
Ferrotungsten, 103-M, 82-V
Ferrous alloys, 269-Q, 978-Q
Ferrous castings, 154-E, 174-E
Ferous metals,
  in aircraft, 209-T
  analysis, chemical, 61-S, 140-S,
  book, 64-V
  coatings for, 14-L, 43-L, 396-R
  corrosion of, 930-Q, 59-S, 209-T
  corrosion-preventive oils for, 293-R
  de-enameling of, 13-L
  deformation of polycrystals of, 215-Q
  desulfurization of — slag composition effects, 42-B
  etchants, metallographic, 413-M
  fractures in, 253-Q
  joining to aluminum and alloys, 846-L, 864-L
  machining, carbide, 26-G
  metallurgy of, 30-D
  phosphating of, 539-L, 710-L
  rare-earth effects, 190-B
  resources of, 74-B
  sawing of, 396-G
  surface treatment before painting of, 936-L
  tearing, hot, 642-E
  titanium in, 12-V
  welding of, 185-K, 621-K, 703-K, 43-L
Ferrous oxide system,
  chromium oxide- silica, 416-M
Ferrovanadium, 149-V
Filing, 345-G
Films, adsorbed, 252-P
Films, organic. See Coatings, paint
Finish. See Surface finish
Finishing. See also Surface finishing
Finishing, 162-G, 199-G, 15-L, 103-L 140-L, 428-L, 610-L, 784-L, 830-L, 866-L
Finishing, barrel. See also Tumbling, barrel, 54,L, 333-L, 435-L, 772-L, 778-L
Fire-fighting equipment, 347-K
Flames. See also Furnaces
Flames, 49-S, 93-S
  theory of — book, 291-T
Flame Radiation Research Joint Committee, 49-S, 93-S
Flame cutting, 356-G, 635-K
  applications of, 437-G, 558-K
  book, 129-K
  carbon arc, 116-G
  electronic tracing head for, 58-G
  equipment for, 353-G
  iron powder plus oxygen, 414-G, 415-G
  machine for, 202-G
  oxyacetylene, 100-G, 325-G, 20-K
  oxygen, 114-G, 238-G, 308-G, 325-G, 414-G, 415-G, 457-G

Flame cutting (cont.)
of steels, 7-G, 228-G, 242-G, 253-G, 295-G
torches for, 272-G
in U.S.S.R , 522-K
Flame hardening. See also Hardening, flame
Flame hardening, 129-J, 132-J, 137-J
Flame heating, 72-B
Flaw detection. See Nondestructive testing
Flotation, 234-B, 237-B, 247-B, 278-B, 279-B
cyanidation in, 126-C
disposal of tailings from, 355-B
equipment for — pneumatic, 231-B
mechanism of, 179-B
particle-size effects, 306-B
radioactive tracer studies of, 92-B, 178-B, 292-S
reagents for, 79-B, 81-B, 216-B, 228-B, 308-B
research on, 16-B
retention time measurement in, 241-B
theory of — Russian developments, 182-B
Flow lines. See Structures, deformation
Flow (of solid metals). See Plastic deformation
Fluidity, 107-E
Fluidized-bed process, 120-B
Fluting test. See Bend testing
Food-processing equipment, 455-K, 355-R, 446-T, 513-T, 565-T
aluminum and alloys in, 355-R, 197-T, 285-T
Forging, 300-A, 10-F, 310-F
book, 79-G
cold, 42-F
control and instrumentation for, 32-F
cost analysis in, 275-J
drop, 81-F, 88-F, 169-F, 282-F, 308-F, 92-S
equipment for, 6-F, 16-F, 20-F, 66-F, 68-F, 146-F, 206-F, 219-F, 269-F, 270-F, 275-F, 328-F, 357-G, 435-G, 477-G
heating, induction, 273-F
heavy-duty — Air Force program, 46-F
hot, 42-F, 132-F
of metals — book, 142-F
panel discussion on, 125-F
presses, 79-F
of railroad-car wheels, 168-F
of rotor disks, 265-F, 268-F, 296-F, 301-F
shop manual, 286-F
upset, 75-F, 149-F
Forging dies. See Dies, forging
Forging furnaces, 19-F
Forging hammers, 8-F, 127-F
Forging industry, 59-F, 60-F, 62-F
Forging plants,
British, 34-F, 39-F
Forging presses, 433-E, 15-F, 191-F, 288-F, 289-F, 292-F, 300-F
Forgings, 214-A, 58-F, 107-F, 142-F, 294-F, 205-G
Formability. See Plastic deformation; Plastic properties
Forming,
acetylene-oxygen torch heating for, 59-G
fiberglass tooling for, 379-G
heating, flame, for, 388-G
hot, 292-G
mechanical equipment for, 206-F
of metals — book, 142-F
at Northrop Aircraft, 70-F
plastic deformation in, 929-Q
plastic tooling for, 378-G
by pressure, 71-F
rubber-pad,
clips for wrinkle prevention, 2-G, 20-G, 397-G
of sheet metals, 400-G
stretch, 1-G, 82-G, 145-G, 210-G, 398-G
Westinghouse centralized engineering service in, 490-G
Forming dies. See Dies, forming
Fouling prevention. See Coatings, anti-fouling
Foundries,
Albion Malleable Iron Co., Albion, Mich, 560-E
American Steel Foundries, East Chicago, Ind., 537-E, 612-E
brass, 570-E
British, 540-E
for cast iron, mechanized, 11-E
ceramic materials in, 124-B
Chautauqua Hardware Corp, 561-E
Dodge Mfg. Co., 434-E
Dominion Magnesium, Ltd., 650-E
equipment for mechanized, 539-E
experimental — Purdue University, 567-E
ferrous, 196-E, 509-E, 598-E
Goltra Foundries, Barrington, Ill, 585-E
investment casting — Watervliet Arsenal, 99-E
jobbing — record system for, 584-E
layout of, 581-E
mechanical equipment for, 177-E
mechanization of, 210-E, 239-E, 259-E, 326-E
melting, 510-E

Foundries (cont.)
nonferrous, 197-E
ventilation of, 26-A
Foundry binders. See also Foundry molding materials
Foundry binders, 23-E, 41-E, 72-E, 83-E, 396-E, 441-E, 449-E, 461-E, 486-E, 496-E, 519-E, 548-E, 646-E
Foundry chaplets, 24-E, 549-E
Foundry cores, 458-E
analysis of, 449-E
baking of, 67-E, 368-E, 593-E
binders for, resin-type, 333-E
blowers for, 70-E, 198-E, 344-E
boxes for, 321-E
casting of, 632-E
for cast iron, malleable, 76-E
drying, infrared, 95-E
equipment for, 372-E
glass-reinforced resin for, 33-E
making of, 244-E, 468-E
oils for, 72-E
removal of, 236-E
veining prevention, 295-E
Foundry furnaces, 26-C, 9-D, 15-E, 28-E, 38-E, 379-E, 424-E, 606-E
Foundry gating systems, 521-E, 522-E, 523-E, 525-E, 526-E, 528-E, 534-E, 601-E
Foundry industry, 117-E, 290-E, 370-E
Foundry molds, 16-E, 95-E, 114-E, 366-E, 447-E, 487-E, 488-E, 538-E, 616-E, 17-T
Foundry molding materials. See also Foundry sands; or Foundry binders
Foundry molding materials, 143-E, 202-E, 225-E, 230-E, 233-E, 274-E, 485-E, 492-E, 541-E, 577-E, 593-E, 595-E
Foundry patterns,
aluminum coreboxes, 296-E
aluminum matchplates, 533-E
book, 470-E
for ferrous metals, 314-E
making of, 161-E, 222-E
matchplates — gypsum in, 353-E
plastics for, 114-E, 148-E
production of, 334-E, 621-E
resin-impregnated plaster, 564-E
sand casting of, 17-T
wood, 272-E
Foundry practice. See also Die casting
Foundry practice, 300-A, 150-E, 402-E, 543-E, 37-F
analysis, spectrographic, in, 246-S
Armour Research Foundation research, 4-E
automatic devices in, 430-E
Foundry practice (cont.)
balanced cores for, 42-E
book, 214-E, 369-E, 518-E, 599-E
in Britain, 457-E
chemistry in — book, 602-E
casting in, 119-C, 260-D, 134-E, 282-E, 479-E, 512-E, 558-E, 9-H, 440-M
concretion or galling defect in, 500-E
Connor-Block feeder, 258-E
corebinders in, 171-E
core-blowing machines in, 169-E
Crane, Ltd., 240-E
crust formation during solidification, 190-E
defects in — book, 471-E
design factors, 274-G
dust in, 26-A, 65-A, 119-E, 327-E, 340-E
ferrous, 131-E, 135-E, 157-E
gating and risering in, 275-E, 301-E
heat flow in, 332-E
heat transfer in, 10-E, 57-E
impregnation in, 164-E
mechanization in, 172-E, 241-E
melting techniques in, 157-D, 238-E
mold "blowing" reaction in, 282-E, 479-E
mold wash in, 133-E
molding in, 153-E, 429-E, 436-E, 624-E, 626-E, 86-H
molding machines, 198-E
nonferrous, 108-E, 138-E, 157-E, 215-E
oxygen in, 452-E
perlite in, 302-E
permanent mold casting in, 155-E, 220-E
physics in — book, 603-E
pouring in, 268-E, 460-E
quality control at International Harvester, 531-E
safety measures in, 373-A
safety precautions in, 81-A
sand casting in, 172-E, 222-E, 248-E, 251-E, 255-E, 265-E, 410-E
scabbing defect in sand castings, 305-E
shakeout and trimming in, 167-E, 271-E
solidification phenomena in, 175-E
specification sheets for, 39-S
statistical analysis of data, 489-E
theory of, 301-E
vermiculite in, 174-E
at White Sewing Machine Corp., 465-E
Foundry rigging, 3-E, 32-E, 170-E, 639-E
Foundry risers, 81-E, 129-E, 209-E
Foundry sands,
blacking additions to, 435-E
book, 628-E
cement in, 277-E, 382-E
compactability of, 74-E
composition of, 412-E
control of, 305-E

Foundry sands (cont.)
density, bulk, 74-E
flowability and moldability of, 309-E
heat flow in, 294-E
heat transfer in moist, 80-E
load-deformation curves of, 144-E
metal penetration in, 60-E, 63-E, 71-E
permeability of, 266-E, 428-E
in precision investment casting, 431-E
preparation of, 194-E, 352-E
properties of, 194-E, 654-E
reclamation of, 194-E, 300-E, 427-E, 557-E
resin binders for, 250-E
scabbing tendencies for gray iron, 62-E
sieve analyses of silica type, 64-E
size classification of, 266-E, 428-E
strength properties of, 74-E, 610-E
surface-tension bonds in, 231-E
synthetic, 551-E, 552-E, 583-E
testing of, 41-E, 87-E, 234-E, 450-E, 453-E, 506-E, 630-E
Fractures. See also Failures
Fractures, 44-M, 36-Q, 118-Q, 546-Q, 774-Q, 781-Q, 782-Q, 816-Q, 863-Q, 948-Q
brittle, 469-Q, 470-Q, 471-Q, 861-Q
Fracture testing, 206-Q, 557-Q
France,
iron ore reserves of, 143-A
steel industry of, 143-A, 251-A
Frankford Arsenal,
research at, 293-A
Free energy, 440-P, 441-P, 458-P
Freezers. See Refrigerators and freezers
Fretting corrosion. See Corrosion, fretting
Friction, internal. See also Frictional properties
Friction, internal, 71-Q, 749-Q
Frictional properties. See also Bearing metals
Frictional properties, 41-Q, 95-Q, 99-Q, 446-Q, 559-Q, 571-Q, 572-Q, 578-Q, 581-Q, 584-Q, 825-Q, 305-R
Frothers. See Flotation; or Flotation reagents
Fuels, 83-A, 50-B, 208-B, 261-B, 338-B, 343-B, 351-B
Furnaces. See also Space-heating equipment
Furnaces,
alloys for construction of, 224-T
annealing, 246-J
arc, 58-C, 182-T
atomic, 103-S
brazing. See Brazing Furnace
Furnaces (cont.)
calculations for — book, 37-B
calibration, 147-S
controlled-atmosphere, 34-J, 36-J, 184-T. See also Heat-treatment furnaces
crucible, 501-E
design of, 315-T
domestic. See Space-heating equipment
efficiency factors, 50-B, 252-T, 400-T
electric, 376-D, 245-E, 279-S, 182-T
enameling, 288-S
forging, 315-B, 121-F, 134-F, 145-F, 157-F, 206-F, 276-F
foundry, 499-E
galvanizing, 534-L
gas-fired, 22-B, 40-B, 43-B, 46-B, 162-E, 1-T, 376-T
heating, 85-B, 3-F, 11-F, 256-J
heat losses in, 334-T
heat transfer in, 315-T
heat treatment, 315-B, 145-F, 276-F, 125-J, 171-J, 179-J, 217-J, 219-J, 222-J, 224-J, 229-J, 232-J, 248-J, 249-J, 406-S
induction, 582-E, 597-E, 182-T
industrial, 1-B, 248-B, 103-C, 62-T, 291-T, 330-T, 448-T
insulation of, 331-B
laboratory, 107-H, 492-P, 301-S, 55-T
liquid bath, 274-J
malleablizing, 152-J
melting, 381-E, 501-E
metallurgical, 302-B, 13-F, 365-P, 422-T, 466-T
metalworking, 315-B
pit, 267-J
refractories for — basic, 36-B
reheating, 50-F, 57-F
for rolling mills, 180-F
rotary, 466-T
salt-bath, 249-J
steelmaking, 339-D, 287-S
Furniture, 800-L, 488-T

Gadolinium, 505-P
Gadolinium alloys
magnesium, 445-E, 572-P
Gages, 183-S, 199-S, 320-S, 361-S, 479-S, 541-S
Gaging. See also Inspection; Thickness measurement
book, 365-S
for dimensional interchangeability, 377-S
electrical methods, 473-S

Gaging (cont.)
equipment and procedures, 224-S
mechanical, 458-G, 1-S, 146-S, 226-S, 299-S, 304-S, 380-S, 414-S, 427-S, 432-S, 454-S
optical, 62-S, 382-S, 393-S
for precision roundness determination, 252-S
standardization in, 345-S
Galena. See Lead Ores
Galling. See Wear
Gallium, 88-V
anodizing of, 207-L
applications of, 143-V
diffusion of indium into, 126-N
expansion, thermal, 83-P
metallurgy, extractive, 101-C
production of, 143-V
properties of, 47-V, 123-V, 143-V
recovery of, 72-A, 69-B
specific heat of, 568-P
spectra, arc, 322-S
structure, crystal, 219-M, 143-V
thermodynamic functions of, 568-P
viscosity of, 539-P
Gallium and alloys, 549-T
Gallium alloys,
copper, 191-M, 329-M, 529-Q
indium, 58-M
properties of, 90-P
tin-zinc, 62-M
Gallium single crystals, 35-P, 36-P
Galvanic corrosion. See Corrosion, galvanic; or Corrosion, electrochemical
Galvanizing. See also Steels or Zinc
Galvanizing,
barrel, 362-L
electrolytic, 759-L
hot dip, 70-L, 698-L, 760-L. 761-L, 843-L
book, 420-L
British Non-Ferrous Metals Research Assn., 6-L
cost analysis in, 275-J
pots for, 791-L
of steel tubing, 745-L
of structural steel, 315-L
of wires, 290-L
zinc for, 516-L, 607-L
zinc replacement in, 348-L
zinc waste treatment, 743-L
phosphating vs., 305-L
solutions for, 348-L, 984-L
of wire — Portuguese plant for, 908-L
zinc dust recovery in, 540-L
zinc replacement in, 322-L
Galvanizing pots, 839-L
Gamma radiography. See Radiography, gamma-ray
Gases, 259-A, 439-P, 454-P
Gas producers, 365-D
Gas-shielded-arc welding. See Welding, gas-shielded-arc
Gas turbines. See Turbines, gas
Gas welding. See Welding, gas
Gating. See Foundry rigging
Gears,
casting of, 559-E, 396-T
corrosion, lubricant, 801-Q
cutting, flame, 271-G
fatigue strength of, 598-Q, 760-Q, 811-Q
fatigue testing of, 454-Q
forging of, 273-F
hardening, induction, 208-J
heat treatment of, 199-J, 760-Q, 811-Q, 483-T
lubrication of, 801-Q, 1002-Q
machining of steels in fabrication of, 483-T
peening, shot, 9-G, 159-G
production of, 199-F, 186-J, 396-T
service life of boron-steel, 760-Q
strength of contact surfaces of, 178-Q
stress-strain properties of, 811-Q
wear resistance of, 692-Q, 1021-Q
General Electric Co.,
metallurgical developments — 1951, 52-A
German silver. See Copper alloys, nickel-zinc
Germanium,
atomic weight of, 165-M
corrosion, galvanic, 395-R
diffusion measurement in, 166-N
in electrical equipment, 487-P, 566-T
electrical properties of, 424-P, 114-T
in electronics equipment, 408-P, 473-P, 520-T, 569-T
expansion, thermal, 165-M
gold-coated, 486-P
Hall effect in, 551-P
heat of fusion of, 416-P
heat treatment of, 473-P
high purity, 544-P
liquid — solid reactions, 58-N
metallurgy, extractive, 101-C
microstructure of cast, 81-M
mobility of electrons in, 549-P
processing of billets, 473-P
properties of, 455-P, 594-P
recovery of, 72-A, 69-B, 73-B, 72-C, 158-C
resistivity of, 221-P, 487-P, 600-P
resources of, 73-B
segregation in, 315-N
specific gravity of molten, 491-P
specific heat of, 216-P, 398-P
structure, crystal, 269-N, 473-P
technology of. 205-V

Germanium (cont.)
thermal instability of, 547-P
thermodynamic properties of, 216-P
vacuum deposition of, 22-N
vapor pressure of, 569-P
Germanium and alloys, 473-P
Germanium alloys,
aluminum-lithium, 408-M
aluminum-sodium, 408-M
copper, 406-M, 529-Q
copper-zinc, 159-M
molybdenum, 75-M
tellurium, 101-M
Germanium coatings, 442-P
Germanium films, 933-L
Germanium-nitrogen system, 86-M
Germanium ores, 73-B
Germanium single crystals, 319-N, 462-P
Germany,
light metals-ware production (1951), 145-A
mineral resources of Eastern Zone, 292-B
nonferrous metals production (1951), 144-A
steel industry of Eastern Zone, 292-B
Glass, 463-G, 169-L, 320-L, 655-L, 134-S, 38-T, 312-T
Glass-metal bonding. See Metal-glass bonding
Gold,
amalgamation of, 225-B
applications of, 566-T, 112-V
bismuth plating of, 847-L
coatings of, 142-L, 360-L, 147-P
conductivity,
electrical, 556-P
thermal, 536-P
corrosion resistance of, 112-V
creep of, 962-Q
crystal growth of, 47-N, 93-N
cyanidation of, 41-C
deposits on glass, 320-L
determination of, 35-B, 21-S
diffusion of silver into, 89-P
economic trends, 95-A, 110-A, 226-A
elastic properties of, 548-Q
electrode potentials of, 338-P
electrodeposition of, 270-L
electropolishing of, 634-L
entropy of, 303-P
fabrication of, 112-V
fractures of, 197-Q
free energy of, 303-P
frictional properties of, 572-Q
growth of colloidal, 136-N
magnetic properties of, 150-P
mechanical properties of, 144-Q, 112-V
metallurgy, extractive, 101-C
Gold (cont.)
neutron absorption by, 306-P
nucleation of colloidal, 136-N
physical properties of, 144-Q, 112-V
polishing of, 937-L
recovery of, 153-A, 29-B, 145-B, 287-B, 93-C
resistivity of, 4-P, 26-P, 87-P, 563-P
separation from platinum metals, 21-S
solubility — in liquids, 41-P
solution heat in molten tin, 500-P
specific heat of, 303-P
surface tension of, 12-P, 259-P, 441-P
thermodynamic properties of, 46-P
viscosity during electrochemical polarization, 195-P
water-vapor adsorption on, 27-P
Gold alloys,
aluminum, 122-M
chromium, 588-P
coating, decorative, 114-L
copper,
density of, 347-Q
anelasticity of, 347-Q
diffraction, electron, 78-M, 208-M
diffusion in, 84-N
in electrical equipment, 358-T
order-disorder modifications in, 215-N
resistivity of, 548-P
superlattice formation in, 152-N, 285-N
transformations, order-disorder, 256-N
copper-silver, 345-P
electrodeposition of, 53-L
magnesium, 70-M
nickel, 330-M, 258-N
palladium, 258-N
platinum, 258-N, 387-T
silver, 46-P, 107-P, 158-P, 194-P, 500-P 597-P
titanium, 246-M, 256-M
Gold coatings, 582-L, 764-L, 485-P, 486-P
Gold electrodes, 342-P
Gold films, 215-P, 566-P
Gold foils, 198-M, 407-P, 538-P
Gold industry,
Canada — 1951, 281-A
Gold ores,
amalgamation of, 311-B
analysis of, 311-B
concentration of, 13-B, 17-B, 56-B, 145-B, 225-B, 332-B
copper-lead-silver-zinc, 58-B
crushing and grinding of, 13-B, 270-B, 275-B
cyanidation of, 225-B, 275-B, 65-C, 126-C
flotation of, 13-B, 17-B, 225-B
leaching of, 17-B

Gold ores (cont.)
microscopy, electron, 26-M
refining, electrolytic, 35-C
roasting of, 259-B
sampling of, 311-B
silver, 1-C
silver recovery from, 56-B
tabling of, 311-B
zinc recovery from, 56-B
Gold plate, 95-M
Gold plating, 53-L, 414-L, 863-L
Gold powders, 106-H
Gold single crystals,
cadmium, 239-N
growth spirals on, 242-M
Gold wires, 265-P, 311-P, 538-P, 393-Q
Grain boundaries,
diffusion at, 125-N, 231-N, 249-N
dislocation density in, 318-Q
energy and structure of, 429-P, 352-P
in metals, 354-P
of metals — book, 362-P
microstructure of, 82-M, 268-N
migration of, 267-N, 268-N, 283-N
migration rates vs. diffusion coefficients, 142-N
plastic deformation at, 317-Q
properties and effects, 315-M
stress analysis, photoelastic, 806-Q
stress relaxation across, 353-P
theory of, 349-P
Grain growth, 261-M, 17-N, 18-N, 192-N
Grain-size determination, 126-Q
Graphic arts. See Lithography; Printing
Graphite, 89-V
Gray iron. See Cast iron, gray
Greases, 94-R
Great Britain,
aluminum production of, 41-V
magnesium production of, 41-V
research laboratories of — book, 173-A
Grinding. See also Machining; Crushing and grinding
Grinding, 361-B
abrasive, 62-G, 155-G, 282-G, 307-G, 528-L, 711-L
abrasives for, 426-G
agents for, 357-L
centerless, 368-G
crush, 374-G
dip, 361-L
electrolytic, 518-G
with jet mill, 354-B
shear energy in, 334-G
surface, 333-G, 262-S
surface temperatures in, 335-G
theory of, 353-B
for weld finishing, 314-G
Grit blasting. See Blasting, abrasive
Growth, grain. See Grain growth
Guided missiles, 497-E
Gunmetal. See also Brasses; Bronzes; or Copper alloys
Gunmetal, 142-E, 510-E
Gunmetal castings, 462-E, 494-E

Hafnium,
analysis, spectrometric, 499-S
applications of, 23-V
cleaning and finishing of, 23-V
distillation from zirconium, 5-C
formability of, 23-V
machinability of, 23-V
mechanical properties of, 23-V
properties of, 5-C
pyrophoric properties of, 455-P
separation from zirconium, 278-A
transformation of, 124-N
weldability of, 23-V
Hafnium ores, 89-B
zirconium, 47-B
Hafnium-zirconium system, 124-N
Hall effect, 178-P, 185-P, 205-P, 291-P, 503-P, 586-P
Hammer milling. See Milling, hammer
Hard alloys, 45-G
Hard facing. See Surfacing, hard
Hard metals. See also Toolsteels; Carbides; Tool and forming materials
applications of, 118-V
as diamond substitutes, 57-T
disintegration of, 71-G
drilling of, 65-G, 394-G
machining of, 30-G, 383-G, 421-G, 428-G, 431-G, 463-G
mechanical properties of, 111-H
production of, 118-V
properties of, 118-V
wear testing of, 838-Q
Hard surfacing. See Surfacing, hard
Hardenability,
book, 156-J
Hardening,
age, 236-N- See also Aging
case, 49-J
flame, 336-G, 2-J, 14-J, 111-J, 195-J, 298-S
furnace for small steel parts, 130-J, 131-J
precipitation, 225-N, 282-N
quench, 6-J, 37-J
strain. See Hardening, work
stress. See Hardening, work
surface, 97-J, 98-J, 178-J
work, 281-F, 450-Q, 749-Q

Hardness,
abrasion — book, 955-Q
cold-work effects, 920-Q
elasticity-modulus ratio to, 831-Q
indentation, 1065-Q
of metals, 809-Q, 869-Q
of metals — book, 161-Q
micro, 1033-Q
relationship to elastic limit, 490-Q
Hardness testing, 366-G, 746-L, 185-Q, 478-Q, 499-Q, 587-Q, 920-Q
apparatus for, 918-Q
book, 161-Q
equipment for, 146-Q, 153-Q
at high temperatures, 113-Q, 870-Q
magnetic, 954-Q
micro, 295-Q, 407-Q, 478-Q, 544-Q
of minerals, 435-Q
Rockwell — of round work, 814-Q
size effects in, 841-Q
Hastelloy C. See Nickel alloys, chromium-iron-molybdenum-tungsten
Heading, cold, 11-G
Heat capacity. See Specific heats
Heat content. See Specific heat
Heat exchangers. See also Chemical equipment; Petroleum-refining equipment
Heat exchangers, 256-F, 98-R
Heat flow. See Conductivity, thermal
Heat-resisting alloys, 247-Q, 27-V, 73-V
applications of, 369-T, 423-T
casting of, 393-E
coatings, ceramic, 20-L, 88-L, 487-L, 550-L, 704-L, 803-L, 934-L
compositions for, 139-V, 152-V, 165-V
corrosion, steam, 386-R
corrosion resistance of, 393-E, 507-Q, 181-R, 475-R
corrosion testing of, 436-R
creep of, 214-A, 462-Q, 670-Q, 678-Q
creep strength of, 507-Q, 221-T
cutting of, 122-G, 531-T
in design, 194-V
elastic properties of, 687-Q
in engines, jet, 231-G, 263-G, 186-Q, 502-T
extrusion, hot, 130-F
fatigue strength of, 372-Q, 395-Q
forging, precision, 193-F
fracture strength of, 678-Q
fracture testing of, 675-Q
hardening, precipitation, 740-Q
intermetallic compounds in, 382-M
investment casting of, 77-E, 497-E
machinability of, 4-G, 231-G, 263-G, 376-G
machining of, 53-G, 234-G, 319-G, 342-G, 367-G, 515-G
Heat-resisting alloys (cont.)
mechanical properties of, 393-E, 253-M, 248-Q, 458-Q, 496-Q, 740-Q, 922-Q, 475-R
mechanical testing of, 77-Q, 507-Q
metallography of, 321-M
microstructures of, 382-M
nondestructive testing of, 274-S
nonferrous, 99-V
notch effects on, 673-Q, 674-Q
physical properties of, 393-E
plastic deformation of, 462-Q
powder metallurgy of, 32-H, 92-H, 117-V, 156-V
presswork in jet-engine fabrication, 410-G
production of, 117-V, 156-V
properties of, 117-V, 156-V
quality control in production of, 39-H
research at Westinghouse, 294-A
selection of, 11-S
sintering of, 89-H, 293-L
specifications for — book, 366-S
spraying, metal, 293-L
strength-testing equipment for, 24-Q
structures, crystal, 382-M
substitute alloys, 306-A
for turbines,
gas, 214-R, 37-T, 221-T, 302-T, 361-T, 370-T, 145-V
jet, 496-Q
vibration damping of, 687-Q
welding of, 24-K, 39-K, 178-K, 344-K, 448-K
welding — book, 251-K
yield strength of, 678-Q
Heat-resisting coatings. See Coatings, heat-resisting
Heat-resisting materials, 687-Q, 51-S
Heat transfer. See Conductivity, thermal
Heat-transfer media, 13-F
Heat treatment, 369-E, 37-F, 12-J, 61-J
atmospheres. See Controlled atmospheres
book, 79-G
controlled atmospheres for, 36-J
cost analysis in, 275-J
design factors, 274-G
equipment for, 248-J, 262-J
high-vacuum, 119-C
induction, 151-J
Kingston Products Co., 8-J, 9-J
marquenching, by, 48-J
mechanized, 57-J
of automobile tools, 142-J
of metals, 300-A
of railroad car wheels, 168-F

Heat treatment (cont.)
research at Frankford Arsenal, 293-A
residual-stress effects, 751-Q
salt baths for, 47-J, 75-J, 100-J
for surface hardness, 270-J
at Teer, Wickwire & Co., Jackson, Mich., 217-J
temperature control in, 397-S
of tractor parts — U.S.S.R., 335-T
of transmission parts, 251-J
Heat treatment furnaces, 24-J, 30-J, 31-J, 33-J, 34-J, 56-J, 61-J, 72-J, 84-J, 201-T
Heat treatment media, 201-J
Heat treatment shops, 186-J, 204-J, 329-S
Heating, 72-B, 208-B, 388-G, 214-J, 802-L, 213-T
Heating systems, 334-T
Helium-arc welding. See Welding, helium-arc
Hematite. See Iron ores
Heusler alloys. See Copper alloys, aluminum-manganese
High-temperature alloys. See Heat-resisting alloys
Holland
standardization practies in, 204-S
Honing and lapping, 56-G, 162-G, 187-G, 159-L
Hot-metal mixers. See Mixers, hot metal
Hot shortness. See Plastic properties
Household appliances, 92-E, 104-E, 503-E, 8-H, 36-L, 86-L, 854-L, 343-T, 429-T
Hydroblasting. See Blasting, liquid
Hydroforming, 213-G, 488-G
Hydrogen,
in blast-furnace process, 244-D
diffusion in iron and alloys, 128-N, 171-N, 292-N
embrittlement of stainless steel blades by, 381-Q
in ingots and forgings, 292-N
introduced into steel from porcelain enamels, 162-L, 168-L, 239-L, 308-L
in metals, 69-E, 549-L, 454-P
nuclear magnetic resonance of, 372-P
in reduction of nickel oxide, 170-P
for reduction of ores, 50-D
solubility in iron, 108-N
in steels, 319-F, 292-N, 308-N
in welding electrodes, 552-K
Hydrometallurgy, 245-B, 246-B, 126-C
Hypodermic needle tubing, 339-T
Hysteresis, elastic. See Elastic properties
Hysteresis, magnetic, 56-P, 93-P, 96-P
Identification. See Sorting; or Spot testing
Ilmenite. See Titanium ores or Iron ores
Impact strength, 501-Q
Impact-tensile testing. See Tensile testing
Impact testing, 115-Q, 514-Q, 540-Q, 549-Q, 644-Q, 854-Q, 894-Q
Inconel. See Nickel alloys, chromium-iron
Inclusions, 390-S
Indentation hardness. See Hardness; or Hardness testing
India,
industrial products of, 133-A
manganese production of, 299-B
mineral resources of, 200-B
resources of — book, 117-B
steel industry of, 101-A, 118-A
Indium,
adhesive properties of, 579-Q, 982-Q
anodizing of, 207-L
creep of, 982-Q
determination of, 444-S
diffusion coefficients for, 72-N
diffusion into gallium, 126-N
in electrical equipment, 566-T
gold absorption by, 306-P
grain growth of, 18-N
high-purity, 335-P
resistivity of, 371-P
solubility in aluminum, 138-N
specific heat of, 552-P
spectra, arc, 322-S, 341-S
structure, atomic, 219-M
Indium alloys,
aluminum, 187-M
aluminum-tin, 187-M
arsenic, 386-M
bismuth, 533-T
cadmium, 533-T
copper, 392-M
gallium, 58-M
lead, 533-T
nickel, 105-M
silver, 529-Q
thallium, 520-P
tin, 533-T
Indium coatings, 764-L
Indium films, 566-P
Indium — indium sulfide system, 158-M
Indium single crystals, 320-N
Induction brazing. See Brazing, induction
Induction heat treatment. See Heat treatment, induction

Induction heating, 165-J, 166-J, 167-J, 168-J, 35-Q, 44-S, 53-S, 106-S
Industrial safety, 54-A
Infrared drying, 959-L
Infrared lamps, 236-L
Ingots, 260-D, 189-N
Ingot casting, 151-C, 5-D, 12-D, 19-D, 47-D, 54-D, 69-D, 70-D, 74-D, 88-D, 172-D, 518-E
Ingot molds, 27-C, 5-D, 51-D, 52-D, 58-D, 95-D, 200-D, 220-D, 223-D, 399-D, 532-E, 619-E, 148-Q, 149-Q, 150-Q
Inhibitors. See Pickling inhibitors; Corrosion inhibitors
Inorganic chemistry, Mellor's text, 116-B
Inspection, 11-A, 83-G, 116-G, 425-S
Instruments, 54-P
Instrumentation. See Controllers
Insulation, thermal. See also Conductivity, thermal
Insulation, thermal, 324-P, 319-T
Intergranular corrosion. See Corrosion, intergranular
Intermetallic compounds, 459-M, 286-P, 577-P, 589-P, 991-Q
Internal friction. See Friction, internal
Internal stresses. See Stresses, internal
International Materials Conference, 154-A
Invar. See Nickel alloys, iron
Investment casting, 294-A, 17-E, 18-E, 52-E, 77-E, 103-E, 121-E, 137-E, 140-E, 178-E, 211-E, 260-E, 286-E, 426-E, 431-E, 497-E, 452-Q
Investment castings, 145-E, 178-E, 204-E, 465-E, 566-E, 623-E, 580-L
Ion exchange, 278-A, 329-A, 339-A, 360-A, 374-A, 97-M
Iridium, 405-P, 188-S, 269-S, 112-V
Iron,
adsorption of organic cations on — halide-ion effects, 510-P
aging of, 301-N, 912-Q
allotropy of, 72-V
alpha, 346-M, 476-M, 314-N, 548-Q
analysis of, 220-R, 19-S, 26-S, 99-S, 346-S, 348-S, 358-S, 431-S, 451-S
anelasticity of, 274-Q, 483-Q, 502-Q, 976-Q
antiferromagnetic character of, 123-P
Armco, 500-G, 464-M, 176-N, 227-N, 18-P, 406-P, 419-P, 439-Q, 680-Q, 706-Q, 979-Q, 43-R, 59-R, 330-R
austenite in low-carbon, 200-M
biogeochemistry of, 170-B
boron solubility in, 56-N
brazing to aluminum, 300-T
Iron (cont.)
carbon solubility in, 197-M
carburization of — electron-diffraction study, 163-J
carburized, 346-M
casting of, 247-E, 440-M
on ceramic oxides — wettability of, 492-P
coatings for, 325-L, 326-L, 644-L, 891-L, 389-P, 242-R, 300-S, 531-T
condensation of vapor, 40-P
conductivity, electrical, 466-P
corrosion of, 274-R, 338-R, 451-R
acid, 27-R, 59-R, 146-R, 147-R, 240-R, 241-R, 248-R, 397-R
atmospheric, 239-R
bacterial, 23-R
chemical, 231-R, 279-R
galvanic, 234-R
gaseous, 509-R
salt, inorganic, 259-R
water, 227-R, 259-R
corrosion inhibitors for, 86-R, 207-R, 278-R, 313-R, 508-R, 520-R
decarburization of, 260-J
degasification of, 260-J
diffusion layers of, 203-N
diffusion in steels, 100-N
economic trends, 226-A
elasticity modulus of, 198-Q
elastic properties of, 1084-Q
electrochemical properties of passive, 241-R
electrode potentials of, 274-R, 278-R
electrodeposition of, 129-L, 270-L
electrolytic, 261-P, 515-Q
electropolished, 815-L
electropolishing, 296-L, 815-L
embossing of, 409-T
embrittlement, hydrogen, 546-Q
emissivity of, 172-P, 436-P
etching of, 402-M, 413-M
in Evans cells, 322-P
extraction from ores, 72-V
fatigue cracks in ingots of, 628-Q, 967-Q
fatigue strength of, 682-Q, 686-Q
fatigue stressing of, 465-M
fatigue testing of, 1094-Q
ferromagnetic properties of, 598-P
by ferrous chloride reduction, 456-P
film thickness after brightening, 914-L
formability of, 923-Q
gamma, 366-L
gas adsorption on — kinetics of, 535-P
gyromagnetic effect, 518-P, 519-P
Hall effect of, 453-P

Iron (cont.)
hardening, quench, 122-J
hardness testing of, 203-N, 360-Q
high-purity, 53-D, 201-D, 811-L, 477-M, 406-P, 13-Q, 45-Q, 151-Q, 480-Q
hydrogen solubility in, 108-N, 1082-Q
impact strength of, 546-Q, 585-Q
inclusions in, 112-M
ingot, 148-Q
magnetic properties of, 150-P, 336-P, 393-P
magnetic strength of, 105-P
magnetic viscosity of, 532-P
magnetized, 220-P, 39-R
manganese diffusion, superficial, 280-N
melting of, 197-D, 254-T
metallographic studies of, 149-M
metal spraying of, 205-L
microscopy, electron, 423-M
microstructure of, 183-M, 200-M
molten, 6-D, 8-D, 158-D, 161-N, 190-P, 329-P, 347-P, 465-P, 498-P, 499-P, 541-P
neutron-scattering cross section, 271-P, 273-P
neutron-transmission cross section, 268-P
nitrogen solubility in γ-phase, 7-P
oxidation of, 138-R, 230-R, 265-R, 303-R
paramagnetism of, 388-P
passivation of, 84-R, 175-R, 207-R, 240-R, 274-R, 312-R
permeability, magnetic, 71-P
pickling of, 970-L
pickling of — book, 700-L
pickling inhibitors for, 395-L
plastic deformation of, 193-Q
polarographic study of, 506-R
polishing of, 121-M
precipitation of carbon in, 286-N
production of, 66-A, 51-C, 363-D, 366-D, 369-D, 373-D
properties of, 176-Q, 72-V
radiation absorption in, 426-P
reactions with liquids, 231-R
radiation scattering by spheres, 181-M
recovery from pickling solutions, 278-A
recrystallization of, 111-N, 214-N
resistivity of, 87-P, 112-P
scaling of, 230-R
shear strength of, 645-Q
silicon diffusion in, 294-N
silicon-oxygen equilibrium in, 91-P
slip shrinkage of, 293-M
solid solutions, polynary, 53-M
solution of, 193-P, 59-R, 171-R
sponge, 83-D, 311-D, 340-D
sulfur activity in, 287-P, 330-P

Iron (cont.)
surface tension at melting point, 259-P
tensile strength of, 546-Q
thermodynamic properties of, 167-P
transformations in, 78-A
tungsten diffusion, superficial, 407-M
vanadium impregnation, superficial, 747-L
wear resistance of, 289-Q
welding to aluminum, 690-K
working, cold, 465-M
wrought. See Wrought iron
X-ray studies of, 149-M
yield point of, 202-Q
vapor pressure of, 38-D, 40-P
zincification of, 195-N
Iron and alloys, 83-N, 128-N, 171-N, 181-N, 292-N, 318-N, 183-Q, 49-R, 402-R
Iron alloys. See also Cast irons, alloy; Cast steels, alloy; Steels, alloy; Stainless steels; Toolsteels; etc.
Iron alloys, 73-V
aluminum, 188-N, 244-N, 271-N, 5-P
aluminum-cobalt-columbium-copper-nickel, 228-P, 334-P
aluminum-cobalt-copper-nickel, 135-M, 165-P
aluminum-copper-nickel, 48-M
aluminum-nickel, 47-M, 49-M, 177-N, 136-P, 161-P
aluminum-phosphorus, 379-M
aluminum-silicon, 244-N, 245-N, 162-P 417-P, 484-P
antimony-phosphorus, 289-M
boron, 201-S
carbon, 268-B, 236-J, 197-M, 335-M, 36-N, 129-N, 202-N, 258-N, 909-Q. See also Cast irons; Steels; etc.
carbon-nitrogen, 335-M
carbon-silicon, 50-M, 51-M, 241-N, 232-P
chromium, 497-K, 281-M, 296-M, 422-P, 457-P, 241-R, 280-R, 489-R, 255-S
chromium-cobalt, 193-M, 159-P
chromium-cobalt-columbium-molybdenum-nickel-tungsten, 899-Q
chromium-cobalt-nickel, 128-M, 240-Q 804-Q
chromium-copper-molybdenum-nickel, 86-V
chromium-manganese, 296-M
chromium-molybdenum, 238-P
chromium-molybdenum-nickel, 4-G, 775-G, 386-R
chromium-molybdenum-nickel-titanium, 672-Q
chromium-nickel, 216-M, 352-M, 383-M, 394-M, 159-P, 376-Q, 255-S

Iron alloys (cont.)
chromium-tungsten, 238-P
cobalt, 278-M, 519-P
cobalt-molybdenum, 430-M
cobalt-nickel, 159-P, 181-P, 234-P, 95-V
cobalt-vanadium, 157-P
copper, 915-Q
copper-molybdenum, 386-R
copper-nickel, 59-M, 332-P
high-purity, 53-D, 201-D
for high temperatures, 152-V
manganese, 11-M, 304-M, 344-M, 345-M, 280-N, 181-P, 13-Q, 151-Q
manganese-nickel, 275-N
manganese-phosphorus, 291-M
mechanical properties of, 903-Q
microscopy, electron, 135-M
molybdenum, 11-M, 137-M, 278-N, 419-P
molybdenum-nickel, 430-M, 493-P
nickel, 278-G
diffusion in, 252-N
elastic properties of, 159-P
elasticity modulus of, 51-P
emissivity, thermionic, 141-P
ferromagnetic properties of, 159-P
grain growth of, 95-N
gyromagnetic effect, 519-P
magnetic properties of, 38-P, 51-P, 71-P, 164-P, 181-P, 240-P, 403-P, 494-P, 512-P
magnetostrictive properties of, 51-P, 430-P
nondestructive testing, fluoroscopic, 255-S
oxide-film structure on, 213-M
permeability of, 368-P, 369-P
phase diagrams of, 11-M
recrystallization of, 95-N
silver plating of, 822-L
structure, crystal, 281-M
transformations in, 2-N, 139-N, 145-N, 204-N
nickel-tantalum, 155-M
nitrogen absorption by, 101-P
phosphorus, 19-M, 515-P
platinum, 98-P, 159-P, 258-P, 260-P
production of, 582-P
rhenium, 171-L
silicon. See also Cast irons, alloy, silicon
annealing, magnetic, 94-P
corrosion of, 15-R, 393-R
electrical properties of, 62-P, 237-P
fluidity of, 422-P
interfacial energy, 441-P

Iron alloys (cont.)
silicon (cont.)
Kerr effect in, 309-P
magnetic properties of, 244-N, 181-P, 494-P
microstructure of carbide phase in, 52-M
permeability, magnetic, 94-P, 378-P
phase diagrams of, 1-N
preferred orientation of cold-rolled, 358-M
stamping of, 459-G
structures, magnetic, 270-P, 299-P, 309-P
superlattice formation in, 244-N
structure, crystal, 382-M
titanium, 257-N
tungsten, 407-M
wear testing of, 75-T
zinc, 127-H
Iron amalgams, 204-M
Iron carbides, 187-P
Iron, cast. See Cast iron
Iron castings. See also Cast irons
annealing effects on removal of sand from, 385-E
applications of, 101-E, 264-E, 414-T
chill testing of, 554-Q
defects in, 544-E
design of, 216-E, 555-E
enameling, porcelain, 491-E, 535-E
advantages of, 50-E, 235-E
gray, 160-E, 499-G
applications of, 106-E, 116-E
chill tests for, 61-E
design of, 106-E, 386-E
gaging of, 37-S
gating systems for, 528-E
mechanical testing of, 489-Q
properties of, 50-E, 235-E
scab defect in, 62-E
testing of, 37-S
impregnation of, 206-E
investment, 293-E, 849-L
malleable, 199-A, 84-E, 529-E, 275-J
Meehanite, 572-E, 157-J
molding of complex parts, 345-E
nodular, 298-T
nondestructive testing, fluoroscopic, 3-S
permanent mold casting of, 193-E
production for enameling, 491-E, 535-E
productivity — Great Britain, 203-A
repair by pouring molten metal, 201-E
sand, 242-E, 335-E, 336-E, 568-E
sand casting of, 193-E
straightening of, 84-E
welding, repair, 435-K

Iron castings (cont.)
white,
gating systems for, 116-E, 528-E
Iron coatings, 422-L
Iron compacts,
boron carbide, 4-H
titanium carbide, 4-H
Iron-copper couple, 364-R
Iron electrodes, 234-R, 537-R
Iron electrodeposits, 164-L, 289-L, 413-L
Iron-glass bonding, 885-L
Iron-hydrogen system, 595-K, 108-N
Iron-FeS-FeO system, 160-P
Iron nitrides, 335-M
Iron ores. See also Iron oxides
aluminum, 94-B
analysis of, 187-S, 451-S
arsenic, 135-B
for blast-furnace process, 167-B, 232-D, 234-D
cobalt recovery from, 82-B
concentration of, 10-B, 48-B, 97-B, 133-B, 156-B, 160-B, 173-B, 177-B, 205-B, 235-B, 300-B, 337-B, 340-B, 346-B, 360-B, 167-D, 234-D, 340-D
concentration of low-grade, 55-B, 233-D
concentration plant for, 349-B, 362-B
conservation of, 235-D
copper leaching from, 359-B
crushing and grinding of, 166-B, 202-B, 219-B, 266-B, 345-B
drying of, 71-B
economic trends, 107-A, 337-B
electrical resistance of, 134-B
flotation of, 135-B, 181-B, 202-B, 279-B, 300-B
heavy-media separation of, 2-B, 114-B, 205-B
jigging of siderite, 205-B
Labrador, 180-B
Lake Superior area, 24-A, 142-A, 220-A
lead-zinc, 172-B
magnesium, 33-B
magnetic properties of pyrrhotine, 290-P
magnetic separation of fines, 61-B
manganese, 126-B
microstructures of pellets, 104-B, 370-B
new deposits, 180-B
porosity testing of, 167-B
production statistics — U.S., 141-A
prospecting for, 170-B
reduction of, 161-B, 166-B, 167-B, 4-D, 13-D, 46-D, 50-D, 72-D, 87-D, 135-D, 148-D, 183-D, 207-D, 211-D, 319-D, 336-D, 6-P
Iron ores (cont.)
resources of, 143-A, 272-A, 26-B, 57-B, 64-B, 144-B, 180-B, 198-B, 211-B, 213-B, 242-B, 277-B, 307-B, 334-B, 356-B, 67-D
roasting of, 132-B, 359-B
in Sahara desert, 220-B
sintered, 44-B, 166-B, 167-B, 168-B, 207-D
sintering of, 75-B, 76-B, 163-B, 164-B
sintering and nodulizing of, 8-B, 11-B, 25-B, 31-B, 32-B, 68-B, 77-B, 226-B, 235-B, 239-B, 347-B, 283-B, 141-D, 340-D
smelting of, 317-B, 167-D, 336-D, 340-D, 341-D, 348-D
in steelmaking, 75-D
strength testing of, 167-B
taconite research, 269-B
titanium, 19-B, 135-C
titanium recovery from, 350-B
vanadium recovery from, 350-B
Iron oxides, 139-A, 127-B, 139-B, 207-D, 397-D, 398-D, 55-N, 106-N, 121-P, 470-P, 225-R, 534-R
Iron-phosphorus system, 379-M, 422-P
Iron, pig. See Pig iron
Iron pipes, 450-K
Iron plating, 32-L, 50-L, 135-L, 486-L, 774-L
Iron powders,
applications of, 15-H, 16-H, 129-H, 342-T, 514-T
cobalt, 67-H
compressibility of, 96-H
copper additions to, 714-Q
flow properties of, 96-H
grain-size effects on products, 76-H
molding and compacting of, 6-H, 76-H, 109-H
particle size determination of, 24-H, 71-H
production of, 30-H, 44-H, 49-H, 57-H, 62-H, 115-H
properties of, 6-H, 43-H, 117-H, 128-H
sintering of, 103-H, 106-H
Iron powder compacts, 6-H, 30-H, 76-H, 121-H, 616-L
cobalt, 67-H
copper, 47-H
Iron powder products,
applications of, 61-H, 62-H, 64-H, 73-H, 341-T, 490-T, 558-T
bend strength of, 105-Q
cobalt, 67-H
conductivity, electrical, 76-H
copper, 7-H, 8-H, 9-H, 81-H, 829-Q, 323-T

Iron powder products (cont.)
copper-impregnated, 100-H, 103-H
corrosion resistance of, 88-H
density of, 46-H, 76-H, 105-Q
design of, 62-H
fabrication of, 73-H
follower from, 17-H
hardness of, 76-H, 88-H, 105-Q
high-density, 62-H
machining of, 88-H, 104-H
microstructure of, 46-H, 62-H, 105-Q
nitriding of, 105-Q
permanent magnets, 263-P, 459-P
properties of, 6-H, 43-H, 45-H, 46-H, 62-H, 356-Q, 915-Q
shear testing of, 714-Q
tensile strength of, 76-H, 714-Q
Iron scrap, 67-A
Iron single crystals, 626-L, 213-M, 330-Q, 380-Q, 798-Q, 465-R, 527-R
nickel, 145-N
silicon, 128-P, 129-P
Iron and steel industry. See also Steel industry
Iron and steel industry,
Germany, Upper Silesia, 223-A
Iron strip. See Sheet iron
Iron system,
aluminum-aluminum phosphide-iron-phosphide, 379-M
chlorine, 456-P
sulfur, 330-P
Iron wires, 175-F, 24-L, 844-L, 324-N, 310-P, 311-P, 346-P, 420-P, 597-P, 200-Q
Italy,
aluminum industry and resources of, 289-B

Jewelry, 192-A, 7-L, 53-L
Joining, 490-G, 84-K
adhesive, 31-K, 32-K, 45-K, 46-K, 64-K, 71-K, 83-K, 144-K, 163-K, 167-K, 581-K, 632-K, 688-K, 716-K, 782-K, 142-P
Joints,
adhesive, 688-K
bolted, 511-K, 542-K, 464-S
brazed, 424-K, 662-K, 718-K
riveted, 409-K, 504-K, 688-K

Katanga Mines, 17-B
Kentanium, 118-H, 122-H
Korea,
metalworking in southern, 303-A

Lacquer coatings. See Coatings, lacquer
Ladles, 309-B, 334-D, 16-Q, 190-T
Lanthanum, 47-C, 12-F, 552-P
Lanthanum alloys,
calcium, 207-M
sodium, 207-M
Lapping. See Honing and lapping
Lattice constants. See also Structures, crystal
Lattice constants, 40-M, 56-M
Lattice structures. See Structures, crystal
Lead,
applications of, 196-A, 216-A, 74-T, 175-V
atmospheric pollution of, 61-A
atomic heat of, 148-P
bend testing of strips, 600-Q
bonding to steel, 130-T
conductivity,
electrical, 308-T
thermal, 530-P
contact melting with antimony, 101-N
contact melting with bismuth, 101-N
continuous casting of, 167-C
as coolant for nuclear reactors, 134-T
copper cladding with, 38-L
corrosion of, 15-R, 80-R, 146-R, 205-R, 248-R, 249-R, 311-R, 314-R, 338-R, 450-R
corrosion prevention of, 520-R
corrosion resistance of, 175-V
creep of, 279-Q, 744-Q, 847-Q, 962-Q, 1052-Q
crystal growth of, 47-N
determination of, 35-B, 48-S, 164-S, 450-S, 511-S, 523-S
diffraction, x-ray, 126-M
diffusion, self, 102-N
economic trends, 2-A, 38-A, 95-A, 102-A 113-A, 115-A, 226-A
electrode potential of, 280-P, 314-P
electrometallurgy of, 24-C, 141-C
fabrication of, 175-V
fatigue strength of, 308-T
film formation on, 348-R
forging of, 7-F
foundry practice, 61-A
fracture of, 699-Q
free energy, interfacial, 441-P
frictional properties of, 429-Q, 572-Q
government regulations, 123-A

Lead (cont.)
grain growth of, 18-N
high purity, 395-P, 744-Q
joining of, 175-V
machining of, 91-G, 254-G
magnetic properties of, 117-P
molten, 544-K, 185-M, 421-P, 560-P
neutron cross section of, 523-P
oxidation of, 16-R
oxygen determination in, 168-S, 248-S
passivation of, 314-P
pickling baths for, 972-L
plating baths, 167-L
polarographic study of, 506-R
polishing, metallographic, 594-L
production of, 134-A, 196-A, 203-A, 175-V
properties of, 74-V
proton-scattering cross section, 269-P
pyrometallurgy of, 85-C
radiation absorption in, 425-P, 426-P
radiation protection with, 164-S, 189-T
reclamation of, 61-A
recovery from copper-roaster flue dust, 287-A
recovery from zinc ores, 93-C, 158-C
recrystallization of, 196-N
resistivity of, 371-P
resources of, 76-A, 74-V
scaling of, 542-R
shear strength of, 744-Q
solidification shrinkage of, 377-E
spectra, arc, 341-S
statistics for — 1951, 155-A
steel cladding with, 38-L
structure, fractographic, 44-M
substitutes for, 196-A
superconductivity of isotopes, 292-P
tensile strength of, 143-Q, 251-T
viscosity of, 153-P, 195-P
welding of, 512-K, 609-K
Lead and alloys, 38-Q, 802-Q, 859-Q, 939-Q, 113-S, 220-S, 385-S, 75-V
Lead alloys,
for anodes, 310-T
antimony, 601-Q
antimony-tin, 154-N
application of, 551-Q, 601-Q, 252-R, 415-T
arsenic, 551-Q, 601-Q
bismuth, 1-K, 434-P, 601-Q
bismuth determination in, 15-S
cadmium-tin-zinc, 153-M
calcium, 188-N
cobalt-silver-tin, 310-T
copper, 395-E, 403-L, 63-M, 267-Q, 89-T, 113-T, 219-T
copper-tin, 238-R, 336-R
Lead alloys (cont.)
die casting of, 158-E, 399-E
extrusion of, 237-F
fatigue testing of, 599-Q
fractures, intercrystalline, 415-T
grain growth in, 415-T
inhibit setting of carbinol glues, 782-K
mercury, 214-P
mercury-sodium, 344-P
nickel, 17-R
oxidation, atmospheric, 415-T
phase diagrams of, 85-C
platinum, 154-M
silver, 601-Q, 351-S
silver-zinc, 205-M
sodium, 163-M, 188-N
tellurium, 188-N, 601-Q, 964-Q
thallium, 118-M
tin, 165-E, 377-E, 358-L, 594-L, 396-P, 143-Q, 601-Q, 1052-Q, 533-R, 12-S
uranium, 174-M
Lead anodes, 27-L, 188-R
Lead bronzes. See Bronzes, lead
Lead burning. See Welding, gas
Lead coatings, 764-L, 805-L, 31-P
tin, 17-R
Lead die castings, 279-T
Lead electrodeposits, 786-K
Lead isotopes, 533-P
Lead ores,
adsorption of Xanthate solutions on galena, 215-B
antimony-copper-tin, 76-C
bismuth recovery from, 145-C
concentration of, 13-B, 233-B, 74-V
copper-gold-silver-zinc, 58-B
copper recovery from, 145-C
copper-zinc, 314-B
crushing and grinding of, 12-B, 13-B, 233-B
flotation of, 12-B, 13-B, 158-B, 214-B, 215-B, 216-B, 233-B
iridium determination in, 269-S
iron-zinc, 172-B
milling, rod, 282-B
oxidation, surface, 214-B
refining of, 145-C, 74-V
resources of, 196-A, 70-B, 201-B
roasting of, 111-C
silver recovery from, 145-C
sintering and nodulizing, 364-B
smelting of, 24-C, 145-C, 74-V
tin, 49-A
zinc, 178-B, 232-B, 267-B, 287-B, 329-B, 369-B, 145-C
Lead plating,
tin, 606-K
Lead powders, 109-H

Lead powder products, 356-Q
Lead scrap, 85-C
Lead selinide, 52-N
Lead shot, 67-T
Lead single crystals, 468-M, 250-N, 320-Q, 1070-Q
Lead system,
carbon dioxide-water, 314-P
sulfate-water, 314-P
water, 314-P
Lead telluride, 52-N
Lead tubing (collapsible), 183-F, 188-F, 349-G
Lead wires, 311-P
Leveling solutions. See Electropolishing
Liberia,
iron ore resources of, 277-B
Light metals. See also Aluminum, Magnesium, Beryllium, and their alloys, applications and economic trends
Light metals
adhesion of, 990-L
applications of, 145-A, 31-T, 490-T
corrosion resistance of, 990-L
die casting of, 45-E, 315-E, 490-T
finishing of, 935-L
forging, hot, 300-G
foundry practice, 276-E
grain refinement of, 571-E
for investment castings, 18-E
melting furnaces for, 376-E
nucleation of, 571-E
pickling baths for, 972-L
porosity of, 990-L
radiography of, 530-S
resources of, 74-B
scrap recovery, 27-B
surface treatment of, 935-L
thermal properties of, 990-L
thickness determination of, 990-L
welding of, 343-K, 621-K, 703-K
Light metals and alloys, 316-S
Light-metal castings, 9-S
Light reflection. See Reflectivity
Lighting fixtures, 254-L
Liquid blasting. See Blasting, liquid
Liquid-solid reactions, 74-D, 87-N, 210-N
Literature
mechanization in searching of, 245-A
punched-card systems for, 19-A
Lithium,
analysis, spectrographic, 59-S
applications of, 19-T
in copper-alloy refining, 140-C
distillation for refining of, 4-C
emissivity, thermionic, 151-P
magnesium solubility in, 129-M
metallurgy, extractive, 101-C
molten, 59-S
Lithium (cont.)
molten, 59-S
resistivity of, 188-P
viscosity of, 132-P
Lithium alloys,
aluminum-germanium, 408-M
Lithium ores, 38-B, 304-B, 341-B
Lithography, 111-L, 941-L, 2-T, 564-T
Locomotives, 135-J, 202-K, 332-K, 316-R, 453-R, 84-S, 388-T
Locomotives, Diesel. See Diesel engines
Lost wax process. See Investment casting
Low-melting point alloys, 1-K, 322-M, 426-R
Lubricants. See also Metalworking lubricants
Lubricants, 11-A, 31-F, 162-F, 321-F, 83-L, 34-P, 96-Q, 559-Q, 583-Q, 305-R
Lubrication, 211-F, 321-F, 263-M, 34-P, 355-P, 571-Q, 512-R
Lubrication, boundary, 34-M, 581-Q, 584-Q, 1024-Q, 305-R

Machinability, 11-A, 4-G, 78-G, 105-G, 239-G, 284-G, 376-G, 422-G, 452-G, 453-G, 454-G, 460-G, 146-Q
books, 275-G, 323-G
Machine tools, 238-A, 380-A, 210-F, 178-G, 276-G, 309-G, 439-G, 467-G, 496-G, 695-K, 283-L
Machinery, 606-L, 615-L, 490-P, 464-R
Machining,
abrasive, 367-L
applications of, 83-G, 204-G, 221-G, 335-T
book, 79-G, 323-G, 425-G
carbide tools for, 124-G
cutting-fluid application — Hi-Jet system, 399-G
cutting-fluid jets in, 72-G, 84-G, 85-G, 86-G, 88-G, 106-G, 109-G, 112-G, 118-G, 127-G, 133-G, 151-G, 220-G, 252-G
cutting force during chip formation, 245-G
cutting-force dynamometer, 312-G
electromechanical, 201-G, 290-G, 363-G
electronics applied in, 523-G
electro-spark, 296-G, 519-G
high-speed, 4-G, 156-G
hot, 53-G, 383-G
lubrication in, 501-G
magnetic chucks for, 32-G
of metals, 300-A
plasticity theory in, 46-G, 324-G
productivity data, 464-G

Machining (cont.)
radioactive tracers in, 21-G, 105-G, 453-G
rake angles in, 340-G
research on, 214-A, 107-G, 183-G, 186-G, 359-G
shear angle relationship in, 494-G
shear energy in, 334-G
spark-discharge, 8-G, 30-G, 147-G, 150-G, 152-G, 382-G
of steel, 94-G
surface-finish factors, 456-S
surface quality in turning, 508-G
temperature measurement in, 293-G
theory of, 276-G, 406-G
thermal deformation in, 358-G
thermal number in, 487-G
with three-dimensional tools, 407-G
tool-force measurements in, 293-G
tool life increase in, 3-G, 87-G, 138-G, 267-G
tool wear in, 86-G
with toolsteels — book, 80-G
ventilation for toxic metals, 91-G, 254-G
Magnesia, 120-C
Magnesium, 11-A
in aircraft, 326-F, 11-T, 79-T, 85-T, 117-T, 413-T, 442-T, 459-T, 460-T
in aluminum casting alloys, 426-Q
aluminum determination in, 384-S
analysis of, 348-S
application of, 260-A, 83-C, 7-T, 97-T, 320-T, 406-T, 565-T, 122-V
in automobiles, 471-T, 141-V
as cast iron nodulizing agent, 199-E, 289-E
casting of, 192-E, 440-M
cathodic protective action of, 189-R, 432-R
cleaning, chemical, 188-L, 474-L
coatings for, 188-L, 588-L, 913-L, 918-L, 944-L, 86-T, 459-T
corrosion of, 146-R, 248-R, 488-R
corrosion inhibitors for, 485-R
corrosion prevention of, 967-L
determination in cast iron, 243-S
drawing of, 351-G, 141-V
density of, 44-P
die casting of, 25-E, 329-E, 359-E, 26-V, 141-V
distillation of, 7-C
economic trends, 37-A, 95-A, 106-A, 226-A, 406-T
electrometallurgy of, 141-C
etching of, 188-L
extrusion of, 14-G, 108-G, 175-G, 176-G, 260-G, 326-G, 141-V
Magnesium (cont.)
fabrication of, 141-V, 235-G
fatigue properties of, 86-T
finishing of, 188-L, 235-L, 345-L
fire extinguishment with BCl_3, 285-A
forging of, 351-G, 891-Q, 993-Q
forming of, 165-G, 436-G, 141-V
foundry practice, 319-E, 891-Q, 993-Q
frictional properties of, 572-Q
grain growth, spiral, 150-N
heat of combustion, 42-P
high purity, 198-P
history of, 38-V
hydrogen introduction into, 1082-Q
joining of, 6-K, 141-V
machining of, 258-G, 436-G, 141-V
magnetic properties of, 479-P
mechanical properties of, 459-T
melting of, 192-E
metallurgy, extractive, 99-C, 131-C, 122-V
microscopy, polarized-light, 391-M
neutron scattering by, 296-P
patternmaking for, 609-E
plating of, 588-L, 630-L, 141-V
polishing of, 436-G
production of, 27-A, 6-V, 41-V
properties of, 176-Q, 122-V
proton scattering by, 255-P, 269-P
recovery from sea water, 83-C, 155-V
removal from titanium by vacuum distillation, 59-C
resistivity of, 16-P, 479-P
silicothermic production of, 45-C, 71-C
single crystals, 407-Q
solubility in lithium, 129-M
specific heat of, 127-P, 501-P
specifications for, 326-S
thermodynamic properties of, 217-P
for titanium ore reduction, 19-C
twinning of, 476-M
welding of, 105-K, 219-K, 287-K, 308-K, 560-K, 726-K
Magnesium and alloys,
in aircraft, 86-T, 460-T
applications of, 288-T, 463-T, 155-V, 177-V
in automobiles, 438-T, 441-T
casting of, 521-E
chemical properties of, 150-V
chromating of, 454-L
coatings for, 183-L, 826-L, 150-V
corrosion of, 251-R
corrosion resistance of, 150-V
creep of, 859-Q, 938-Q
design for, 463-T
fatigue strength of, 133-Q
finishing of, 829-L

Magnesium and alloys (cont.)
forming of, 448-G
foundry practice, 150-V
Gmelin's Handbook, 150-V
grain refinement in, 439-E
hardenability of, 150-V
joining of, 448-G, 829-L
machining of, 265-G, 448-G
mechanical properties, 922-Q
metallurgy, extractive, 150-V
new developments, 31-V
oxidation, high-temperature, 245-R
phase diagrams of, 150-V
physical properties of, 150-V
polishing of, 265-G
review on, 76-V, 77-V
in ships, 349-T, 371-T
structures, crystal, 150-V
surface treatment of, 150-V
welding of, 81-K, 183-K, 444-K
Magnesium alloys, 105-V
aluminum, 226-E, 262-E, 374-E, 625-E, 87-J, 231-K, 245-R
aluminum-copper, 46-M, 260-M
aluminum-zinc, 301-M, 319-M, 189-R, 443-S
applications of, 190-F, 832-Q, 94-T, 122-T, 205-T, 206-T, 564-T, 198-V
bending strength of truck wheels, 832-Q
bismuth, potassium, 457-M
brazing of, 640-K
cadmium, 248-M, 469-M, 65-P
casting of, 82-E, 158-E, 247-E, 399-E, 633-E, 943-Q, 992-Q
cerium-manganese-nickel, 482-Q
cerium-thorium, 263-Q
cerium-thorium-zirconium, 535-Q
chromating of, 457-L, 458-L, 459-L, 460-L, 466-L, 467-L
cleaning, chemical, 457-L, 458-L, 459-L, 460-L, 890-L
coatings for, 416-L, 418 L, 421-L, 472-L, 635-L, 890-L, 463-R
copper, 70-M
copper-nickel, 71-M
copper-tin, 410-M
copper-zinc, 297-M
corrosion of, 466-L, 166-P, 116-R, 246-R
corrosion prevention of, 463-R
corrosion resistance of, 463-R
corrosion testing of, 997-L
creep of, 168-Q, 172-Q, 364-Q
degassing of, 108-C
in design, 194-V
determination of zirconium in, 485-S
economic trends in, 60-T
extrusion of, 943-Q, 992-Q
Magnesium alloys (cont.)
fatigue equations for, 745-Q
fatigue strength of truck wheels, 832-Q
forging of, 43-F, 56-F, 65-F, 325-F, 943-Q, 992-Q
for forgings, 891-Q, 993-Q
forming of, 305-Q
fracture of, 443-M
gadolinium, 445-E, 572-P
gating systems for, 521-E
gold, 70-M
grain refining of, 108-C
heat treatment of, 77-J, 145-J, 242-J
hot-forming conditions for, 70-F
iron determination in, 220-R
literature review, 42-V
machinability of, 285-G
machining of, 285-G, 943-Q, 992-Q
mechanical properties of, 890-Q
melting of, 66-E, 553-E
melting furnaces, induction, 582-E
metal cutting temperatures in, 369-G
microstructure of, 52-V, 125-V
nickel, 70-M
nondestructive testing, fluoroscopic, 63-S
physical properties of, 890-Q
polishing of, 937-L
properties of, 53-V
rare earth, 94-Q, 109-Q, 168-Q, 633-Q, 759 Q
rare earth-zinc-zirconium, 149-E, 50-V
rare-earth-zirconium, 500-Q
research of I.G. Farbenindustrie, 168-V
salt-spray testing of, 416-L
silver-tin, 297-N
silver-zinc, 297-N
specifications for, 890-Q, 367-S
strength properties of aircraft parts, 590-Q
stress corrosion of, 250-R, 331-R
stress relief, thermal, 87-J
stress strain properties of truck wheels, 832-Q
structure, crystal, 87-M
surface treatment of, 640-K, 997-L
swaging of, 330-F
tensile strength of, 640-Q
thorium, 263-Q
thorium determination in, 221-S
thorium-zinc-zirconium, 935-Q, 182-V
thorium-zirconium, 535-Q
uranium, 391-M
weldability of, 640-K
welding of, 175-K, 217-K, 368-K, 714-K
workability of, 943-Q, 992-Q
wrought — Canadian progress, 14-Q
zinc, 46-M, 377-E
zinc-zirconium, 87-J, 14-Q
zirconium, 183-B, 180-M, 452-M

Magnesium alloy castings, 374-E, 451-E, 417-L, 891-Q, 993-Q, 286-S, 42-V
Magnesium-alloy sheets, 535-K, 630-K, 818-Q, 220-R
Magnesium-alloy welds, 535-K
Magnesium anodes, 125-R, 190-R, 285-R, 443-R
Magnesium castings, 634-E
for aircraft, 149-E, 449-T
creep strength of, 891-Q, 993-Q
design of, 891-Q, 993-Q
fatigue strength of, 891-Q, 993-Q
hardness testing of, 110-Q
heat treatment of, 891-Q, 993-Q
impact strength of, 891-Q, 993-Q
impregnation of, 206-E
nondestructive testing of, 35-S, 55-S
porosity control of, 110-Q
sand, 579-E
sawing of, 13-G, 449-G
stress analysis, brittle-coating, 771-Q
Magnesium die castings, 206-E, 422-E, 256-L, 509-L, 511-L, 427-T, 537-T
Magnesium electrodeposits, 630-L
Magnesium extrusions, 463-T
Magnesium forgings, 891-Q, 993-Q
Magnesium industry, 97-A, 308-A, 99-C, 26-V
Magnesium ores, 33-B, 286-B, 341-B, 32-C, 34-C, 131-C
Magnesium scrap, 35-A
Magnesium sheets, 258-F, 226-G, 257-G, 31-K
Magnesium single crystals, 419-M, 284-N, 138-Q, 266-Q
Magnesium telluride, 100-M
Magnesium tubing, 183-F, 436-G
Magnesium welds, 640-K, 65-S
Magnet wire, 9-P
Magnetic materials, 294-A, 54-P, 162-P, 326-P, 328-P, 363-P, 527-P
Magnetic properties, 4-M, 25-P, 85-P, 97-P, 256-P, 274-P, 337-P, 482-P, 126-Q, 292-T
Magnetic structures. See Structures, magnetic
Magnetic testing, 410-P, 527-P
Magnetism. See also Magnetic properties
Magnetism, 363-P
Magnetite. See also Iron ores
Magnetite, 19-B
Magnetostrictive properties, 749-Q
Malleability. See Plastic properties
Malleable iron. See Cast iron, malleable
Malleablizing, 152-J
Manganese,
biogeochemistry of
bronzes. See Bronzes, manganese
Manganese (cont.)
conservation in steelmaking, 229-D
determination of, 26-S, 268-S, 348-S, 358-S, 447-S
diffusion in ferrous metals, 161-N, 280-N
economic trends, 95-A, 226-A, 299-B
electrolytic, 254-B, 107-V
electrometallurgy of, 2-C, 144-C
high-purity, 178-V
hydrogen introduction into, 1082-Q
for iron deoxidation, 8-D
losses during steel ingot casting, 115-D, 116-D
metallurgy, extractive, 101-C
neutron cross section of, 48-P, 268-P
production of, 102-C
recovery of, 12-A, 211-A, 278-A
recovery from scrap, 77-C, 78-C, 79-C, 90-C, 94-C, 100-C, 106-C, 109-C, 112-C, 149-C
recovery from slag, 185-A, 9-B, 107-B, 280-B, 49-C
solid solution in chromium, 1-M
transformations, allotropic, 46-N, 246-N
Manganese alloys,
aluminum, 188-N
aluminum-silicon, 334-M
antimony, 377-P
antimony-nickel, 104-P
bismuth,
coercive force of, 464-P
chromium, 200-N
chromium-iron, 296-M
cobalt, 133-N
copper, 343-M, 270-N
copper-nickel, 72-M
iron, 11-M, 344-M, 345-M, 280-N, 181-P
iron-phosphorus, 291-M
nickel, 210-Q
thorium, 65-M, 353-M
titanium, 257-N
Manganese cast irons. See Cast irons, alloy, manganese
Manganese ores,
concentration of, 95-B, 96-B, 123-B, 133-B, 136-B, 146-B, 147-B, 148-B, 176-B, 191-B, 255-B, 299-B, 144-C
domestic and foreign production of, 242-A
flotation of, 148-B, 191-B
hydrometallurgy of, 78-B
jigging of, 148-B
prospecting for, 170-B
reduction of, 77-C, 78-C, 79-C, 90-C, 94-C, 100-C, 106-C, 109-C, 112-C, 149-C, 107-V
resources of, 108-A, 185-A, 80-B, 176-B, 198-B, 299-B
roasting of, 126-B

Manganese ores (cont.)
sintering of, 191-B
smelting of, 144-C
Manganese printing, 215-M
Manganese steels. See Steels, alloy, manganese
Marine-atmosphere corrosion. See Corrosion, atmospheric
Martempering. See Hardening, quench
Martensite, 15-N, 33-N, 36-N, 129-N
Matchplates. See Foundry patterns
Materials, 70-A, 227-Q, 96-S, 60-T
strength of — book, 1006-Q, 1093-Q
Materials Handbook, 16-V
Materials-handling equipment. See Mechanical-handling equipment
Mechanical cleaning. See Cleaning, mechanical
Mechanical descaling. See Descaling
Mechanical-handling equipment, 336-G, 193-J, 270-T
Mechanical polishing. See Polishing
Mechanical properties, 463-P, 509-Q, 588-Q, 749-Q, 783-Q, 821-Q, 834-Q, 923-Q, 947-Q, 292-T
Mechanical testing, 85-Q, 570-Q, 588-Q, 793-Q, 473-S
Medical and surgical equipment, 290-T
Melting. See also Foundry practice
Melting, 199-C, 408-E, 167-J
Melting, 119-C, 408-E, 167-J
Melting furnaces. See Furnaces, melting
Mercury, 95-A, 104-A, 140-E, 550-E, 83-N, 85-N, 153-P, 155-P, 168-P, 307-P, 338-P, 539-P, 557-P, 362-R, 450-R
Mercury alloys, 228-M, 214-P, 344-P, 78-V
Mercury electrodes, 236-P, 307-P
Mercury ores, 70-B
Metals,
aging of, 70-N
analysis of, 2-S, 312-S
antique, 235-S
for atomic power plants and reactors, 397-T, 399-T
carbide reactions with, 492-P
carbon determination in, 270-S, 381-S
cathodic protection of, 134-R
cation adsorption on, 311-P
chemical properties of, 749-Q
chemistry of extraction procedures, 21-D, 137-D
cladding of, 218-L, 770-L
cleaning of, 57-A, 71-L, 116-L, 198-L, 249-L, 260-L, 266-L
coatings for, 184-L, 249-L, 266-L, 442-L
cold-worked, 16-M
Metals (cont.)
conductivity,
electrical, 138-P, 149-P, 223-P, 243-P, 373-P,
thermal, 76-P, 77-P
coordination number change during melting of, 294-M
corrosion of, 97-R, 101-R, 133-R, 328-R, 515-R
creep of, 233-Q
crystal growth in, 219-N
deformation of, 335-Q
determination of oxide coatings on, 185-S
diffusion of hydrogen through, 49-N, 53-N
economic trends, 317-A, 343 A, 27-B, 20-C, 500-T
effect of impurities on properties of, 344-Q
electrical-resistance measurements of, 134-P
electrochemical series of, 208-R
electrode potentials of, 529-P
electron theory of, 475-M
electropolished, 435-P
electropolishing of, 295-L
expanded, 230-T
extraction of — book, 118-C
extrusion of — book, 120-F
failures of, 197-Q
fatigue testing equipment for, 236-Q
ferromagnetic properties of, 138-P
filing of, 95-G
finishing of, 144-L, 187-L, 265-L, 893-L
flame cutting and gouging of, 101-G, 102-G
flow of, 456-E
forging, hot, 111-F
fracture of, 224-Q, 161-S
of future, 191-V
gas absorption on, 69-E, 439-P, 454-P
gas treatment of, 43-B
as gasket materials, 443-T
handbook of compositions and designations, 233-A
hard. See Hard metals; Tool and forming materials; Carbides; Toolsteels
health hazards, 13-A
heating of, 167-J, 365-P
high-purity, 46-C, 869-Q
history of — book, 88-A
hydrophobic coatings for, 169-L
ionic radii of, 202-P
joining, adhesive, 211-K, 397-K, 437-K, 572-K
liquostriction in, 558-P
lithography of, 258-L

Metals (cont.)
for low-temperature service, 585-Q
machinability of, 136-G, 328-G
machining of — book, 372-G
macrostructures of, 209-M
magnetic suspectibilities of, 531-P
mechanical properties of, 275-G, 32-Q
mechanical testing of, 402-Q, 664-Q
melting of, 328-E, 408-E, 495-E, 578-E
microstructures of, 209-M
molten, 10-E, 29-E, 36-E, 69-E, 550-E, 601-E, 222-M, 295-N, 32-P, 454-P, 507-P, 404-S, 405-S, 399-T
new developments, 182-A
nitride reactions with, 492-P
nitrogen in, 553-P
nondestructive testing of — book, 126-S
nonferrous. See Nonferrous metals
nuclear and atomic structures of, 140-M
nuclear-radiation effects, 397-T, 399-T
oxidation of, 529-P, 135-R, 357-R
oxygen determination, isotopic, 449-S
permanent mold casting of, 656-E
phosphating of, 249-L
plastic deformation of, 7-F, 96-M, 303-Q
plastic properties of, 151-F
polarized light reflection by, 3-P
preparation for coatings, 294-L
polishing of, 224-L, 625-L, 690-L
porous. See Metal powders
price-volume ratio for, 239-A
processing at subzero temperatures, 119-J
production of, 80-A
properties at low temperatures, 602-P
protective finishes for, 143-L
pure. See Metals, high-purity
pyrophoric, 455-P
refining of — book, 118-C
reflectivity of — aging effects, 324-P
rigidized, 298-T
resistivity of, 95-P, 182-P
scattering of electrons by dislocations in, 373-P
sheet. See Sheet metals
shock-wave propagation in, 117-Q
solidification of, 10-E, 45-N, 51-N, 134-N
sorting of mixed, 403-S
stopping power for charged particles, 242-P
strategic, 10-A, 17-A, 149-A, 165-A, 306-A, 313-A, 27-B, 48-T
strength properties of, 455-Q
stresses in, 205-Q
strip. See Strip metals
structural, 111-Q
structure, atomic, 6-M
Metals (cont.)
structure of — conference, 15-M
structure, crystal, 324-Q, 325-Q
structures, dislocation, 210-M
structure, electronic, 6-M
structure, surface, 440-M
sulfide reactions with, 492-P
transfer during static loading and impact, 846-Q
transformations, allotropic, 184-P
transition, 243-M, 258-M
uncommon, 95-A, 25-V, 204-V
U.S. imports and exports, 277-A
vibration frequencies in, 179-P
wetting effect in, 558-P
workability of, 275-G
working of, 369-E, 174-G
Metal-ceramic bonding, 497-K
Metal coatings, 31-P, 37-P, 39-P
Metals, composite, 986-L
Metal filaments, 204-P
Metal films, 133-P, 204-P, 411-P, 546-P
Metal finishing, 137-L, 213-L, 675-L, 828-L, 842-L, 850-L, 879-L
Metal-glass bonding, 29-K, 34-K, 181-K, 326-K, 756-K, 822-L, 95-V
Metal-nonmetal bonding, 83-K, 387-K, 497-K, 641-K
Metal-nonmetal powder mixtures, 113-H
Metal-plastic composite sheets, 314-T
Metal-plastic bonding, 80-K, 295-K, 310-K, 131-T
Metal plates, 927-Q, 983-Q
Metal-plated fabric, book, 203-R
Metal powders. See also Powder metallurgy
Metal powders,
activity measurement, 111-H
analysis of, 96-H
compressibility of, 96-H
in design, 194-V
electrodeposition of, 38-H
extinction effects in, 93-H
flow properties of, 96-H
impurity effects, 10-H
molding and compacting of, 52-H, 75-H, 92-H, 109-H
properties of — book, 27-H
rolling of strip from, 112-H
sampling of, 96-H
sieve analysis of, 96-H
sintering of, 75-H, 106-H, 111-H, 116-H
specifications for — book, 367-S
surface-area determination, 77-H
Metal powder compacts, 84-H, 105-H
Metal-powder products,
application of, 8-H, 915-Q, 297-S, 9-T, 27-T, 171-T

Metal-powder products (cont.)
finishing of, 580-L
infiltration of, 13-H
mechanical properties of, 13-H, 27-H, 915-Q
nonferrous, 102-H
as permanent magnets, 130-H
physical properties of, 13-H
porosity control in sintering of, 116-H
production of, 65-H
production of complex parts, 105-H
specifications for — book, 367-S
stresses, residual, 132-Q
Metal products,
Armed Forces procurement, 30 A
Metal-rubber bonding, 50-K, 65-K, 142-K, 163-K, 333-K, 509-K
Metal scrap, 34-A, 201-A
Metal spraying, 8-L, 125-L, 154-L, 181-L, 203-L, 293-L, 347-L, 617-L, 870-L, 960-L
Metal-wood bonding, 64-K, 80-K
Metallic coatings. See Coatings, metallic
Metallic oxides. See Oxides
Metallic surfaces. See Surfaces, metallic
Metallizing. See also Coating, sprayed-metal
Metallizing, 9-L, 67-L, 75-L, 119-L, 122-L, 446-L, 452-L, 603-L, 605-L, 896-L, 901-L
Metallography, 162-M, 202-M
ASTM committee report, 265-M, 267-M, 401-M
electron, 108-M
etching, gaseous, 38-M
grain structure determination in, 91-M
at high temperatures, 38-M
of inclusions, nonmetallic, 13-M
microradiography in, 25-M
microscopy in, 14-M, 218-M, 303-M, 357-M
of oxide layers, 321-M
of recrystallized cubic wires, 399-M
shadow casting in, 332-M, 424-M
of structures, deformation, 60-Q
Metallurgical furnaces. See Furnaces, metallurgical
Metallurgy, 73-A, 130-A, 591-P, 604-P, 238-Q, 636-Q, 5-S, 24-S
abstract services for, 218-A
in archeology, 282 A
book, 268-A, 297-A, 28-M
developments in, 120-A
dictionary of, 193-A, 262-A, 357-A, 378-A
diffraction methods in, 107-M
electrochemistry in, 2 P
encylopedia on, 158-A
Metallurgy (cont.)
for engineers — book, 271-A, 382-A
engineering — book, 229-A, 364-A
extractive — book, 298-A, 116-B, 148-C
dust and fume recovery, 124-A
review of 1951 developments, 225-A, 246-B
thermodynamics of, 6-P
ferrous, 283-A, 292-A, 323-A
high temperature, 562-T
inventions needed for — book, 92-A
manufacturing equipment in — book, 89-A
microanalysis in, 202-M, 277-M
National Bureau of Standards research, 36-A
patents for free use in — book, 362-A
physical — book, 232-A, 300-A, 223-M, 445-M
magnetic methods in, 474-P
physics in, 328-A
Plansee Seminar on, 119-H
research at Frankford Arsenal, 293-A
research review for 1951, 69-A
Russia — works of Grum-Grzhimailo, 234-A
technical societies and trade associations, 32-A
Metalworking, 355-K
abstract services for, 218-A
book, 518-E, 226-F, 28-M
carbide dies for, 16-G
electronics in, 44-S
equipment for, 195-F
felt in, 190-L, 872-L
furnaces, gas-fired, 315-B
high-vacuum applications, 119-C
lubricants, 444-E, 162-F, 240-F, 329-G, 579-L
magnetic chucks for, 32-G
noise problem in, 114-A
outlook for 1962, 246-A
plastics in, 114-E
plastic tooling for, 230-G
quality control, statistical, 13-S
refractory fibers for, 316-B
research at Frankford Arsenal, 293-A
sintered-carbide tools for, 37-G
in South Korea, 303-A
technical trends, 29-A, 50-A
trade associations and technical socieites, 32-A
wastes, 7-A, 18-A, 42-A, 44-A, 178-A, 321-A
Metalworking industries, 30-A, 31-A, 45-A, 46-A, 50-A, 51-A, 100-A, 131-A, 231-A, 315-A, 319-A, 222-G
Metamics. See Ceramic-metal combinations
Metrology. See Gaging; Inspection

Micrography. See Microscopy
Microhardness. See Hardness, micro-
Microhardness testing. See Hardness testing, micro-
Microradiography. See Microscopy, X-ray; Diffraction, X-ray; or Radiography, X-ray
Microscopes
  electron, 298-M
  interference, 41-S
  optical,
    for surface studies, 14-M, 218-M, 353-S
  phase-contrast, 290-M
  proton, 67-M
  surface-profile, 202-S
Microscopy,
  electron, 10-M, 29-M, 120-M, 150-M, 157-M, 179-M, 213-M, 225-M, 227-M, 250-M, 276-M, 318-M, 323-M, 324-M, 357-M, 258-S, 262-M, 441-S
  in metallography and metallurgy, 202-M
  motion-picture, 322-M
  optical, 13-M, 27-M, 230-M, 233-M, 276-M, 355-M, 358-M
  optical-ultraviolet, 234-M
  polarized-light, 391-M
  resin-embedment techniques, 405-M
  of structures, metallic, 303-M
  X-ray, 381-M
Mild steels. See Steels
Military equipment. See also Armor and ordnance
Military equipment, 68-F, 316-L, 488-L, 787-L, 166-V
Mills, hammer, 447-T
Milling, 83-G
  face, 247-G
  hammer, 325-B
  rod,
    equipment for, 282-B
Minerals. See also Ores
Minerals,
  conservation of, 209-B
  economic trends, 248-A, 317-A, 54-B
  flotation of — gas-adsorption effects, 59-P
  formation of — book, 34-B
  hardness testing of, 435-Q
  identification, microscopic, 77-S
  particle-size measurement of powders, 20-S
  resources of, 273-A, 274-A, 90-B, 209-B, 250-B
    Newfoundland, 276-B
    foreign vs. U.S., 251-B
    Russian sattelites, 292-B
    Turkey, 372-B
    World — book, 352-B
Minerals (cont.)
  review of 1951 developments, 225-A
  shortage in U.S., 248-A
  strategic — conference on, 368-B
  surface tension of, 251-P
  thermal-analysis apparatus, 369-S
Mineral industry, 86-A
Mineralogy, 26-M, 77-S
Mining, 225-A, 227-A, 202-B, 209-B, 246-B, 373-B
Mining equipment, 336-G, 438-G, 48-K, 577-K, 321-L, 889-Q, 72-T, 96-T, 210-T, 211-T, 425-T, 534-T, 550-T, 571-T
Mining industry, 264-A, 356-A, 361-A, 175-B, 193-B
Mixers, hot-metal, 309-B, 114-D, 257-D, 258-D
Mixtures, 603-P
Modulus of elasticity. See Elasticity, modulus
Molds. See also Foundry molds
Molds, 75-L
Molding. See Foundry practice
Molding sands. See Foundry sands
Molten metals. See Metals, molten
Molybdenum,
  for aluminum-alloy grain refinement, 35-E
  analysis of, 230-S, 338-S, 358-S
  annealing of, 92-P
  applications of, 23-V, 28-V, 190-V
  brittleness of, 114-M
  as cast-iron nodulizing agent, 199-E, 289-E
  chemical properties of, 528-P
  cleaning and finishing of, 23-V
  coatings for, 917-L, 934-L, 37-V
  corrosion of, 452-P, 28-V
  corrosion resistance of, 371-R, 549-T
  creep strength of arc-cast, 6-Q
  creep testing of, 394-Q
  determination of hydrogen in, 197-S
  determination of nitrogen in, 197-S
  determination of oxygen in, 197-S
  diffusion, superficial, 278-N
  ductility of, 6-Q, 199-Q, 394-Q
  economic trends, 95-A, 226-A
  electrode potential of, 452-P
  emissivity, spectral, 172-P
  extrusion, hot, 171-F, 198-F, 205-F, 208-F, 228-F
  fabrication of, 58-H
  forging of, 67-F
  formability of, 23-V
  hardness of, 351-Q, 436-Q
  hardness, hot, 113-Q
  in heat-resisting alloys, 382-M, 28-V
  machinability of, 23-V
  magnetic properties of, 479-P

Molybdenum (cont.)
mechanical properties of, 528-P, 53-Q, 23-V, 28-V
neutron cross section of, 48-P
nickel cladding of, 166-L
oxidation of, 28-V
oxidation resistance of, 351-Q
physical properties of, 528-P, 28-V
plating of, 542-L
processing of, 37-V
production of, 58-H, 394-Q, 28-V
properties of, 184-T, 543-T
pyrophoric properties of, 455-P
recovery from coal, 69-B
recovery from copper ores, 110-B
resistivity at low temperatures, 479-P
rhenium recovery from, 124-C
rolling of, 67-F
siliconizing of, 950-L
solubility of carbon and oxygen in, 77-N
structure, crystal, 114-M
technology of, 206-V
tensile strength of, 6-Q, 351-Q, 394-Q, 436-Q
thermoelectric properties of, 92-P
vapor pressure at high temperature, 209-P
weldability of, 593-K, 23-V
welding of, 799-K, 28-V
Molybdenum and alloys, 110-L
aluminum, 220-M, 883-Q
boron, 396-M, 57-N
chromium, 883-Q
chromium-cobalt, 193-M, 241-M
chromium-cobalt-nickel, 241-M
chromium-nickel, 484-G, 193-M, 241-M
chromium-nickel-tungsten, 484-G
cobalt, 883-Q
cobalt-iron, 430-M
cobalt-nickel, 241-M, 430-M
cobalt-tungsten, 172-L, 857-L
columbium, 593-K
corrosion resistance of, 114-R
fabrication of binary, 883-Q
germanium, 75-M
hardness, hot — of binary, 883-Q
iron, 11-M, 137-M, 278-N, 883-Q
iron-chromium, 238-P
iron-nickel, 430-M
mechanical properties of, 883-Q
nickel, 452-P, 60-R
silicon, 651-L, 254-M, 883-Q
tantalum, 2-M, 235-M, 114-R
titanium, 593-K, 76-N
tungsten, 593-K, 1-M, 883-Q
vanadium, 593-K
Molybdenum borides, 279-M, 396-M
Molybdenum carbides, 133-M, 361-M
Molybdenum-ceramic bonding, 193-V
Molybdenum ores, 341-B
Molybdenum powders, 24-H, 49-H, 58-H, 401-P
Molybdenum-powder products, 49-H, 100-H, 220-M, 6-Q, 53-Q, 436-Q
Molybdenum sheet, 262-Q
Molybdenum single crystals, 1013-Q
Molybdenum steels. See Steels, alloy, molybdenum; or Toolsteels, molybdenum
Molybdenum tubing, 17-K
Molybdenum wires, 651-L, 195-Q, 192-S
Monazite. See Thorium ores; or Rare earths
Monel metal. See Nickel alloys, copper
Mumetal. See Nickel alloys, iron-copper
Motorcycles, 120-T, 565-T
Musical instruments, 261-T

N-155 alloy. See Chromium alloys, cobalt-columbium-iron-manganese-molybdenum-nickel-tungsten
National Bureau of Standards, 36-A, 49-L
National Research Council Review, 171-A
Natural-gas equipment, 37-R, 379-R
Naval brass. See Copper alloys, tin-zinc
Necking. See Tensile testing
Neodymium, 590-P
Neptunium, 436-M, 264-P
Neumann bands. See Structures, deformation
Neutron cross section, 47-P
Newfoundland, 276-B
Nickel,
absorption spectrum of, 218-P
aluminum plating on, 631-L
anelasticity of, 976-Q
applications of, 177-A
carbon diffusion in, 227-N
as cast-iron nodulizing agent, 199-E, 289-E
cathodic protection of, 89-R
on ceramic oxides — wettability of, 492-P
coatings, vacuum-deposited, 124-M
conductivity, electrical, 466-P
conservation of, 210-A
converter practice, 121-C
in copper-base alloys — grain-size effects, 33-M
corrosion of, 452-P, 55-R, 67-R, 99-R, 311-R, 388-R, 509-R
corrosion prevention of, 967-L
corrosion resistance of, 100-R
corrosion testing of, 513-R
determination of, 26-S, 48-S, 275-S, 317-S, 335-S

Nickel (cont.)
diffusion into copper, 30-N
drawing of, 83-F, 500-G
economic trends, 95-A, 226-A
elasticity modulus of, 51-P
electrochemistry of, 88-C
electrode potentials of, 338-P, 452-P
electrodeposition of, 27-L, 270-L, 380-L
electroforming of, 88-C, 39-L, 488-L
electrolytic precipitation by ultrasonics of, 653-L, 961-L
electrometallurgy of, 88-C, 141-C
electropolishing of, 88-C, 714-L
emissivity of, 436-P
in enamel plant — saving of, 297-L, 402-L
energy density of electronic states of, 224-P
energy levels in, 402-P
ferromagnetic properties of, 598-P
gyromagnetic effect, 518-P, 519-P
Hall effect of, 453-P
hardening, work, 905-Q
high-purity, 631-Q
historical survey of, 333-A
hydrogen introduction into, 1082-Q
hysteresis, magnetic, 56-P
investment casting of valve parts, 182-E
magnetic properties of, 150-P, 336-P, 391-P, 392-P, 406-P
magnetocaloric effect, 595-P
magnetostrictive properties of, 51-P, 130-P
metallurgy, extractive, 110-V
neutron scattering by, 296-P
neutron-transmission cross section, 268-P
oxidation, high-temperature, 49-R
passivation of, 506-P, 243-R
permeability, magnetic, 51-P
polishing of, 937-L
in porcelain enameling, 304-L
production of, 253-A, 133-C
recovery of, 166-A, 249-A, 334-A, 339-A
refining of matte, 40-C
resistivity of, 87-P, 563-P
single crystals, 407-Q
solution potential — aqueous, 55-R
stress-strain properties, 905-Q
structure,
atomic, 54-M
crystal, 272-M
substitutes for, 210-A, 313-A
sulfur diffusion in, 227-N
supply situation, 177-A
surface tension at melting point, 259-P
tensile strength, 905-Q
thermodynamic properties of, 397-P
ultrasonic propagation in polycrystalline, 357-P
welding of, 304-K

Nickel and alloys,
annealing of, 80-J, 136-J, 242-J
applications of, 189-F, 15-V, 90-V
conductivity,
electrical, 210-P
thermal, 210-P, 437-R
corrosion of, 15-R, 44-R
corrosion resistance of, 953-Q, 437-R
electrical properties of, 953-Q
emissivity, thermionic, 207-P
hardness testing of, 667-Q
for high temperatures, 953-Q
magnetic properties of, 953-Q
mechanical properties of, 922-Q, 953-Q, 437-R
physical properties of, 953-Q
pickling baths for, 972-L
properties of, 90-V, 15-V
sulfur pick-up at high temperatures, 288-P
wear against clay particles, 183-Q
welding of, 236-K, 282-K

Nickel alloys
aluminum, 54-M, 300-M, 120-P
aluminum-cobalt, 327-P
aluminum-iron, 47-M, 49-M, 177-N, 136-P, 161-P
aluminum-manganese, 307-M, 308-M
aluminum-manganese-silicon, 690-K
aluminum-titanium, 441-M
annealing furnace for, 182-J
antimony-manganese, 104-P
application of, 843-Q, 214-R, 332-R, 276-T, 294-T, 502-T
arsenic, 105-M
beryllium, 54-E, 843-Q, 172-V, 184-V
bismuth, 302-P
cadmium, 173 L
casting of, 490-E
cathodic protection of, 89-R
chromium, 690-K, 21-M, 194-M, 325-M, 440-M, 455-M, 172-Q, 364-Q, 511-Q, 49-R, 280-R, 64-S
welding of sheet, 24-K
chromium-cobalt, 127-M, 193-M
chromium-cobalt-columbium-iron, 216-T
chromium-cobalt-columbium-iron-molybdenum-tungsten, 899-Q
chromium-cobalt-iron, 240-Q, 128-M, 804-Q
chromium-cobalt-iron-molybdenum, 216-T
chromium-cobalt-iron-titanium, 216-T

Nickel alloys (cont.)
chromium-cobalt-iron-tungsten, 216-T
chromium-cobalt-iron-vanadium, 216-T
chromium-cobalt-molybdenum, 241-M
chromium-columbium-iron, 511-Q
chromium-iron, 159-P
applications of, 511-Q, 843-Q, 298-T
coatings, ceramic, 20-L, 98-L
conductivity, thermal, 358-P
corrosion, gaseous, 509-R
creep of, 376-Q
elasticity hysteresis of shafts, 773-Q
forming of, 416-G, 423-G, 441-G
frictional properties of, 843-Q
hardness of, 511-Q
impact strength of, 383-M, 511-Q
machinability of Inconel X, 4-G
mechanical properties of, 843-Q
microstructure of, 511-Q
phase diagrams of, 352-M, 394-M
plastic deformation of, 1020-Q
presswork in jet-engine fabrication, 441-G
shock resistance, thermal, 51-S
sigma phase in, 383-M
stress corrosion of, 494-R
structure, crystal, 394-M
tensile strength of, 1004-Q
tensile testing of, 1004-Q
torsion strength of Inconel shafts, 773-Q
wear resistance of, 843-Q
welding of, 416-G, 423-G, 441-G, 177-K, 338-K, 448-K, 667-K, 790-K
chromium-iron-molybdenum, 153-V
chromium-iron-molybdenum-tungsten, 752-L, 15-R, 340-R, 51-S
chromium-manganese-silicon, 790-K, 843-Q
chromium-manganese-silicon-tungsten, 1078-Q
chromium-molybdenum, 484-G, 193-M, 241-M, 15-R
chromium-molybdenum-tungsten, 484-G
chromium-titanium, 325-M
coatings for, 280-L, 884-L
cobalt, 430-P, 519-P, 522-S
cobalt-chromium-molybdenum-tungsten, 161-M
cobalt-iron, 159-P, 181-P, 234-P, 95-V
cobalt-molybdenum, 241-M, 430-M
compositions of Nimonic type, 114-Q
copper,
applications of, 54-P, 843-Q, 2-T, 109-V
brazing of, 39-V
brazing, silver, 455-K
carbon diffusion in, 227-N
conductivity, thermal, 358-P

Nickel alloys (cont.)
copper (cont.)
corrosion inhibitors for, 485-R
creep testing of, 866-Q, 867-Q
crystal orientation in, 451-M
diffusion in, 41-H, 252-N, 258-N
elasticity hysteresis of shafts, 773-Q
electrical properties of, 226-P
embrittlement, hydrogen, 495-R
fracture testing of, 866-Q, 867-Q
frictional properties of, 843-Q
gating systems for, 523-E
hardening, work, 905-Q
heat treatment of, 39-V, 109-V
homogeneity of sintered, 467-M
machinability of, 109-V
magnetic properties of, 226-P, 403-P
magnetostrictive properties of, 430-P
mechanical properties of, 843-Q, 109-V
metallizing of driveshaft, 731-L
microstructure of, 274-M
physical properties of, 109-V
properties of, 39-V
recrystallization of, 866-Q
reflectivity, polarized-light, 3-P
resistivity of, 367-P
sintering of, 41-H
soldering of, 86-P, 39-V
solidification of, 523-E
stress corrosion of, 494-R, 495-R
stress-strain properties at low temperatures, 905-Q
structure, crystal, 453-M
sulfur-diffusion in Monel, 227-N
tensile strength at low temperatures, 905-Q
torsion strength of Monel shafts, 773-Q
Volta potentials in, 88-P
wear resistance of, 843-Q
weldability of Monel, 109-V
welding of, 22-K, 93-K, 690-K, 790-K, 39-V
copper-iron, 59-M, 332-P, 340-P
copper-magnesium, 71-M
copper-silicon, 456-R
corrosion of, 157-R, 205-R, 378-R
corrosion fatigue of, 214-R
corrosion resistance of, 507-Q, 294-T, 80-V, 195-V
creep of, 279-Q
creep strength of, 507-Q
creep testing of heat-resisting, 949-Q
cutting fluids for, 146-G
degassing, 263-E
fabrication of, 188-V
fatigue strength of, 507-Q
frictional properties of, 396-Q, 843-Q
gold, 330-M, 258-N, 500-R

Nickel alloys (cont.)
hardness of, 920-Q
heat treatment of, 77-J, 242-J, 114-Q
for high temperatures, 247-Q, 139 V, 152 V
indium, 105-M
iron,
applications of, 278-G, 843 Q
diffusion in, 252-N
elastic properties of, 159-P
elasticity modulus of, 51-P
electrode potentials of, 302-P
emissivity, thermionic, 141-P
ferromagnetic properties of, 159-P
frictional properties of, 843-Q
grain growth, 95-N
gyromagnetic effect, 519-P, 562-P
magnetic properties of, 164-P, 181-P, 240-P, 403-P, 417-P, 512-P
magnetic properties of thin sheets, 494-P
magnetization of sheet, 38-P
magnetostrictive properties of, 51-P 430-P
mechanical properties of, 843-Q
microscopy, electron, 423-M
nondestructive testing, fluoroscopic, 255-S
oxide-film structure on, 213-M
permeability, magnetic, 51-P, 71-P, 368-P, 369-P
phase diagrams of, 11-M
recrystallization of, 95-N
silver plating of, 822-L
wear resistance of, 843-Q
iron-chromium, 255-S
iron-copper-molybdenum, 279-P
iron-molybdenum, 430-M, 84-P, 493-P, 494-P, 15-R, 399-R
iron-tantalum, 155-M
lead, 17-R
lithium, 302-P
magnesium, 406-E, 70-M, 120-P
magnetic properties of, 188-V
manganese, 208-N, 120-P, 210-Q
mechanical properties of, 114-Q, 843-Q, 195-V
melting, induction, 490-E
molybdenum, 452-P, 60-R
oxidation, high-temperature, 214-R
physical properties of, 114-Q
platinum, 500-R
polishing of, 937-L
potentials in sea water, 369-R
properties of, 80-V, 188-V
silicon, 139-M, 146-M, 430-P
silver, 122-P
sodium in contact with, 185-R
Nickel alloys (cont.)
structures, crystal, 382-M
tin, 58-L
titanium, 325-M
titanium determination in, 463-S
tungsten, 120-P
tungsten carbide, 110-H
vanadium, 66-M, 245-M, 393-M, 200-N
wear resistance of, 843-Q
welding of, 210-K, 252-K, 282-K, 621-K, 645-K, 703-K, 80-V
zinc, 70-H, 466-M, 64-R
Nickel alloy tubing, 387-R
Nickel brasses. See Brasses, nickel
Nickel bronzes. See Bronzes, nickel
Nickel-cadmium batteries, 430-T
Nickel carbide, 400-P
Nickel cast irons. See Cast irons, alloy, nickel
Nickel castings, 849-L
Nickel catalysts, 121-A
Nickel coatings, 764-L
Nickel compacts, 4-H
Nickel-copper couples, 228-N
Nickel electrodes, 231-P, 235-P, 236-P, 302-P, 304-P, 517-T
Nickel electrodeposits,
adhesive strength of, 352-L
on automobile parts, 381-L, 505-L, 510-L
chromium, 174-R
cobalt, 721-L
copper, 721-L
growth of, 153-L, 530-L
hardness of, 352-L
mechanical properties of, 780-L
microstructure of, 780-L
physical properties of, 780-L
porosity of, 352-L, 496-L, 721-L
on steels, 400-L, 415-L, 785-Q
stress reduction of, 170-L
structure of, 955-L
tin, 58-L, 861-L
use for, 160-L
wear resistance of, 413-L
zinc content vs. corrosion resistance, 834-L
Nickel foil, 994-L
Nickel ores,
acid leaching of — recovery of nickel by, 150-C
cobalt, 312-B
concentration of, 49-A, 6-B, 210-B, 110-V
crushing and grinding of, 4-B, 6-B, 210-B
electrometallurgy of, 8-C
flotation of, 210-B
leaching of, 99-B

Nickel ores (cont.)
reduction, chemical, 77-C, 78-C, 79-C, 90-C, 94-C, 100-C, 106-C, 109-C, 112-C, 133-C, 149-C, 170-P
refining of, 49-A, 31-C
resources of, 110-V
smelting of, 49-A, 31-C
Nickel plating, 780-L
on aluminum and alloys, 414-L, 479-L, 636-L, 707-L, 723-L
anodes for, 155-E, 56-L
applications of, 450-L, 705-L, 199-R, 200-R
bronze-plating as substitute for, 426-L, 429-L, 441-L
chemistry of, 88-C
chromium, 84-L, 94-L, 873-L
cobalt, 470-L
defects in, 95-L
of iron powder compacts, 616-L
on iron single crystals, 626-L
National Bureau of Standards research, 49-L
porosity factors, 496-L
solutions for, 133-L, 345-L, 352-L, 469-L, 795-L, 832-L, 834-L, 983-L
of steels, 624-L, 297-T
substitutes for, 97-L, 99-L
tin, 861-L
Nickel powders, 128-H, 401-P
Nickel-powder compacts, copper, 21-H
Nickel-powder products, 430-T
Nickel salts, 54-C
Nickel scrap, 77-C, 78-C, 79-C, 90-C, 94-C, 100-C, 106-C, 109-C, 112-C, 149-C
Nickel sheets, welding, 404-K
Nickel silver. See Copper alloys, nickel-zinc
Nickel single crystals, 473-Q
Nickel slags, 5-B
Nickel steels. See Steels, alloy, nickel
Nickel tubing, 17-K, 294-K, 198-R, 209-R, 476-R
Nickel wires, 324-N, 38-P, 420-P, 597-P
Niobium. See Columbium
Ni-Resist. See Cast irons, alloy, chromium-nickel
Nitralloys. See Steels, alloy, aluminum-chromium-molybdenum
Nitrides, 195-B, 284-B, 118-V
Nitriding, 252-J, 276-J
Nitrogen, 69-E, 7-P, 553-P, 383-S, 407-S
Nondestructive testing, 301-A, 206-Q, 97-S, 120-S, 285-S, 470-S, 483-S, 487-S, 509-S
Nondestructive testing (cont.)
of boiler tubes, 121-S
book, 216-S
with cobalt^{60} 82-S, 149-S, 468-S
of compressor blades, 539-S
contact-coil process, 355-S
for detecting faults, 545-S
equipment for, 38-S
fluoroscopic, 63-S, 255-S, 372-S
gamma-ray, 332-S, 527-S
in Germany, 213-S
indirect methods, 244-S
interpretation of, 480-S
liquid-penetrant, 172-S
magnetic, 75-S, 173-S, 175-S, 176-S, 180-S, 294-S
radiographic, 18-S, 32-S, 33-S, 151-S, 155-S, 173-S, 228-S, 282-S, 293-S, 413-S, 529-S, 552-S
of surface defects, 379-S, 515-S
ultrasonic, 57-S, 178-S, 179-S, 181-S, 206-S, 236-S, 245-S, 283-S, 295-S 418-S, 438-S, 516-S, 536-S, 551-S
applications of, 303-S
of brazed joints, 327-S
equipment for, 389-S
image-conversion technique, 378-S
x-ray, 205-S
Nonferrous alloys, 256-J, 296-Q
Nonferrous billets, 113-F
Nonferrous castings, 154-E, 174-E, 651-E, 50-S, 99-V
Nonferrous ingots, 36-C
Nonferrous metals
analysis of, 141-S
applications of, 209-T, 388-T
casting of, 943-Q, 992-Q
compositions of — U.S.S.R., 307-S
conductivity, electrical, 567-P
conservation of, 197-A
corrosion of, 209-T
corrosion testing of, 436-R
deformation of polycrystals of, 215-Q
electrometallurgy of, 141-C
extraction of, 152-C
extrusion of, 82-F, 943-Q, 992-Q
fabrication of — Poland, 49-A
flame cutting of, 122-G
forging of, 943-Q, 992-Q
fractures in, 253-Q
heat treatment of, 78-J, 242-J
for high temperatures, 99-V
inspection of — U.S.S.R., 307-S
iron determination, polarographic, 431-S
Jugoslav export of, 254-A
machining of, 943-Q, 992-Q
melting of, 245-E
packaging, corrosion-preventive, 317-R, 365-R

Nonferrous metals (cont.)
paramagnetic resonance absorption by, 511-P
pickling of — book, 227-L
Polish plans, 49-A
powder metallurgy of, 102-H
production of, 27-A, 144-A, 162-A
recovery of
Japan (book), 267-A
Germany (book), 267-A
refining of, 152-C
resources of, 74-B, 242-B
review, 370-A, 276-E
rolling of — Poland, 49-A
scrap recovery of, 27-B
sintering of, 165-B
specifications — U.S.S.R., 307-S
surface energies of, 203-P
tearing, hot, 642-E
titanium in, 12-V
weldability of, 438-K
welding of, 132-K, 185-K
welding of — book, 438-K, 602-K
workability of, 943-Q, 992-Q
working, cold — book, 333-F
Nonferrous ores
concentration of, 267-A, 298-B
reduction of — thermodynamics, 6-P
roasting of — thermodynamics, 6-P
Nonferrous scrap, 112-A, 119-A
Nonferrous wires, 141-J
Notch brittleness. See Brittleness
Notch fatigue. See Fatigue
Notch sensitivity. See also Strength properties
Notch sensitivity, 718-Q
Notch toughness. See Toughness
Nuclear physics, 322-A
Nuclear reactors, 134-T, 201-V
Nucleation, 9-N, 21-N, 43-N, 78-N, 114-N, 197-N, 219-N, 238-N, 625-Q

Office equipment, 490-T
Oil-well equipment
aluminum and alloys in, 228-T, 270-T, 403-T
cathodic protection of, 460-R
corrosion of, 422-R, 441-R, 442-R, 458-R, 459-R, 498-R
corrosion cracking of, 496-R
corrosion inhibitors for, 367-R, 404-R
corrosion prevention of, 198-R, 209-R, 210-R, 476-R
drill pipes — tensile testing of, 995-Q
fatigue testing of, 406-Q
hydrostatic pressure testing of, 505-S
Oil-well equipment (cont.)
nondestructive testing of, 296-S
pressure testing of pipe for, 52-S
stress analysis, photoelastic, 770-Q
welding of, 420-K, 645-K, 745-K
Omes electroforging process, 220-F
Openhearth furnaces,
air infiltration in, 145-D, 251-D, 272-D
Armco Steel Corp., Middletown, Ohio, 353-D
basic, 10-D, 11-D, 184-D, 280-D, 282-D, 283-D, 284-D, 286-D, 386-D, 309-D
Bethlehem Steel Co., Lackawanna Plant, 226-D
Bethlehem Steel Co., Sparrows Point, Md., 101-D
blowers for, 175-D
bottoms for, 2-D, 94-D, 214-D, 249-D
burners for, 31-D, 40-D, 81-D, 175-D, 230-D, 295-D
charging equipment for, 221-D
control and instrumentation of, 139-D, 338-D
cooling water for, treatment of, 132-D
design of, 45-D, 106-D, 107-D, 108-D, 371-D, 375-D
dolomite bricks in, 228-D
economics of, 63-D, 331-D
efficiency calculations, 28-D
flow in, 18-D, 225-D, 252-D
fuels for, 216-D, 338-D, 342-D
gas sampling from, 130-D, 131-D
heat transfer in, 351-D
instrumentation of, 34-S
jet operation in, 293-D
jet tapping of, 32-D, 104-D, 105-D
Jones & Laughlin Steel Corp., 3-D, 15-D
maintenance and scheduling — Ford Motor Co., 102-D
model experiments on, 18-D, 93-D, 250-D
natural-gas firing of, 129-D, 361-D
recuperative, 267-D
refractories for, 36-B, 102-B, 309-B, 327-B, 34-D, 45-D, 82-D, 91-D, 103-D, 110-D, 111-D, 112-D, 125-D, 126-D, 184-D, 269-D, 281-D, 285-D, 365-D
roof design for, 73-D, 168-D, 387-D
steelmaking in, 381-D
temperature measurement and control, 131-S, 132-S
uniflow-type, 266-D
wear factors, aerodynamic, 225-D, 252-D
wear in roofs of, 372-D
Openhearth process, 167-D, 357-D
acid, 109-D, 304-D
addition agents for, 122-D
at Armco Steel Corp., 98-D
auxiliary equipment for, 365-D

Openhearth process (cont.)
basic, 48-D, 134-D, 304-D
basicity determination, spectrographic, 328-D
blowing in, 163-D
carbon-content control in, 329-D
carbon-oxygen equilibrium in, 36-D
charge calculations for, 55-D, 328-D, 241-D
charge specifications, 76-D, 124-D
charging in, 67-D, 392-D
chemistry, physical — bibliography of, 170-D
control and instrumentation of, 338-D
cupola process effects, 264-D
dust control in, 314-D
economics of, 203-D
flame shapes for, 351-D
flow control in, 326-D
fuel viscosity control for, 313-D
heat-transfer theory, 28-D
hot metal use in, 138-D
improvements in, 100-D
at Inland Steel Co., 96-D
instrumentation in, 298-D
at Jones & Laughlin, 41-D
at Kaiser Steel Co., 99-D
Liberian and Moroccan ore in, 259-D
materials conservation effects, 243-D
models for, 128-D, 255-D
oil carburization of gas for, 216-D
operating manual, 365-D
oxygen in, 26-D, 177-D, 301-D, 320-D
pig iron for — low-Mn, 95-D
productivity study of, 184-D
refractories for, 89-D
scrap compositions for, 101-B
slags in, 147-B, 389-B, 498-S
sonic energy in, 145-S
sulfur control in, 17-D
sulfur equilibrium — gas-slag, 7-D
sulfur take-up by steel from fuel in, 178-D
for tinplate — Russian practice, 161-D
Optical microscopy. See Microscopy, optical
Optical properties, 110-P, 564-P
Order-disorder transformations. See Transformations; or Superlattice formation
Ordering. See Transformations; or Superlattice formation
Ores,
analysis of, 35-B, 249-S, 537-S
classification of — review, 245-B
classifiers for, 305-B
concentration of, 45-B, 66-B, 83-B, 108-B, 153-B, 194-B, 209-B, 224-B, 240-B, 260-B
Ores (cont.)
concentration of (cont.)
centrifugal apparatus for, 232-B
cyclone process, 333-B
developments for 1951, 173-B, 246-B
electrochemical, 257-B
electrostatic, 245-B
gravity, 245-B
low-grade, 203-B, 204-B, 205-B
in North America, 258-B
in Sweden, 202-B
crushing and grinding of, 91-B, 121-B, 153-B, 203-B, 243-B
cyclones in milling and concentration of, 98-B, 105-B
cyclone separation of, 173-B
dewatering of — Loewenheim process, 202-B
flotation of, 115-B, 122-B, 131-B, 157-B, 173-B, 181-B, 203-B, 245-B
heavy-media separation of, 245-B
hydrometallurgy of — review, 245-B, 246-B
identification, microscopic, 77-S
magnetic separation of, 133-B, 149-B, 173-B
microscopy, electron, 26-M
nonferrous. See Nonferrous ores
oxidation, surface — of low-grade, 203-B
radioactive, 49-B, 6-S
reduction of, 17-C, 50-D, 32-P
resources of, 34-A, 201-A, 273-A, 274-A, 288-A, 359-A, 197-B, 242-B
book, 34-B, 159-B
Finland, 130-B
Jordan, 142-B
South Africa, 342-B
Western U.S., 39-B
roasting of, 120-B, 203-B
sampling of, 125-B, 138-B, 249-S
screening of, 265-B
sizing of, 91-B, 245-B
sulfide, 59-B, 173-B, 216-B, 202-B, 75-P, 469-P
supply situation, 317-A
U.S. imports and exports, 277-A
Orientation, preferred. See Structures, deformation
Osmium, 405-P, 513-S, 514-S, 112-V
Ovens. See also Furnaces
Ovens, 331-B, 430-L, 876-L, 345-T
Overvoltage. See also Electrode potentials
Overvoltage, 383-P, 232-R, 260-R
Oxidation. See also Corrosion
Oxidation, 265-N, 266-N, 283-N, 22-R, 265-R, 280-R, 290-R, 354-R
Oxidation, internal. See Corrosion, intergranular

Oxides, 91-C, 138-C
Oxide films, 844-Q, 335-Q
Oxygen,
in Bessemer process, 239-D, 240-D, 247-D, 352-D, 359 D, 360-D
in blast-furnace process, 25-D
in cupola process, 46-E
determination, isotopic, 449-S
in electric steelmaking, 227-D
in ferroalloy production, 206-B
in foundry practice, 452-E
in gas producers, 26-D
in metals — determination of, 549-L
in open hearth process, 26-D, 320-D
for steel cutting, 241-G
in steels — determination of, 411-S, 534-S
in steelmaking, 185-B, 206-B, 167-D, 236-D, 237-D, 358-D, 359-D, 360-D

Packaging materials, 58-A, 472-R
Paint coatings. See Coatings, paint; or Coatings, paint-spray
Painting. See also Coatings, paint
Painting, 15-L
Palladium, 937-L, 442-Q, 188-S, 337-S, 112-V
Palladium alloys,
cadmium, 98-M
copper, 316-N
gold, 258-N
hydrogen, 513-P
mercury, 228-M
rhodium, 514-P, 561-P
silver, 252-N, 226-P, 561-P
zinc, 99-M
Palladium coatings, 764-L
Palladium electrodeposits, 359-L
Palladium plating, 148-L
Palladium wires, 311-P, 372-P
Papermaking equipment, 450 L, 3-R, 518-R, 394-T
Paramagnetism, 502-P, 596-P
Particle-size determination, 71-H, 20-S
Passivation, 355-P, 243-R, 276-R, 296-R, 299-R
Passivation agents. See Corrosion inhibitors
Patterns. See Foundry patterns
Peening, 412-G
Peening, shot, 89-G, 90-G, 274-G, 354-G, 371-G, 429-G, 433-G, 521-G
of gears, steel, 9-G, 159-G
Pens, finishing, 220-L
Permalloys. See Nickel alloys, iron
Permanent magnets, 517-P, 527-P, 226-T, 356-T

Permanent magnets (cont.)
powder metallurgy of, 130-H
Permanent magnet materials, 91-T, 146-T, 219-P
alloy steels for, 192-P
Alnico composition, 517-P
aluminum-iron-nickel alloys as, 177-N
bismuth-manganese alloy, 464-P
demagnetization of, 191-P
elastic properties of, 159-P
ferromagnetic properties of, 159-P
iron-powder products as, 263-P, 459-P
magnetic properties of, 156-P, 157-P, 228-P, 229-P, 230-P
magnetic viscosity of, 379-P
magnetostriction in, 578-P
testing of, 189-P
thermoelectronic emission from, 135-P
Permanent mold castings, 580-L
Permeability, magnetic, 749-Q
Petroleum-refining equipment
aluminum in, 403-T, 408-T
coatings for, 330-L, 537-L
corrosion, salt-water, 163-R
corrosion inhibitors for, 165-R, 404-R
corrosion prevention of, 164-R, 166-R, 271-R, 332 R
ferrous metal tubing in, 556-T
furnace tubes for, 319-F
graphitization of steels in, 86-Q
materials for, 425-R, 29-T, 367-T
welding of, 363-K, 420-K, 426-K, 698-K
Phase diagrams, 300-A, 11-M, 83-M, 136-M, 212-M, 442-M, 456-M, 300-P
Phosphates, 162-F
Phosphate coatings, 209-L, 279-L, 447-L, 882 L, 966-L
Phosphating, 214-F, 366-G, 158-L, 263-L, 305-L, 539-L, 561-L, 727-L, 756-L, 784-L, 818-L
Phosphor bronzes. See Bronzes, phosphor
Photoelastic stress analysis. See Stress analysis, photoelastic
Photographic equipment, 428-T
Photography, 40-S, 364-S
Photomicrography. See Microscopy
Physical properties, 300-A, 292-T
Pickle liquor. See Pickling solutions
Pickling, 278-L
equipment for, 33-L, 238-T
inhibitors in, 163-L, 278-L, 395-L, 998-L
materials conservation in, 786-L
solutions for, 6-A, 85-A, 151-A, 152-A, 237-A, 241-A, 278-A, 363-A, 3-L, 69-L, 845-L
strip, 140-L
for surface improvement, 971-L
wastes, 205-A

Pig iron. See also Blast-furnace process; or Cast iron
Pig iron, 72-V
analysis of, 43-S, 450-S
for gray iron castings, 163-E
casting of, 337-D, 399-D
desulfurization of, 23-D, 312-D, 380-E
from iron pyrites — Stürzelberg Process, 27-D
mechanical properties of, 396-D
openhearth refining of, 320-D
pouring of, 252-E
production of, 78-A, 204-D, 368-D
recovery from magnetite, 350-B
recovery from zinc ores, 93-C
refractories for production of, 215-D
silvery — Globe Iron Co., 212-D
statistics, consumption and production, 117-E
synthetic, 305-D
Piles. See Nuclear reactors
Pipes. See also Tubing or Pipelines
Pipes, 187-F, 140-J, 100-G, 776-K, 693-L, 1062-Q, 326-T
Pipelines. See also Steels or Pipes
Pipelines,
aluminum in, 403-T
cathodic protection of, 178-R, 285-R, 286-R, 291-R, 295-R, 315-R, 368-R, 443-R, 461-R, 523-R
coatings for, 173-K, 597-L, 598-L, 794-L, 13-P, 140-P, 257-R, 523-R
corrosion of, 334-R, 491-R
corrosion prevention of, 590-L, 433-R, 460-R, 477-R, 520-R
failure, stress, 1074-Q
materials for, 92-K, 557-T
nondestructive testing, 261-S
welding of, 213-F, 171-K, 173-K, 272-K, 301-K, 413-K, 468-K, 543-K, 633-K, 697-K
Pitting, 407-R
Plaster casting, 204-E, 556-E
Plastics, 239-A, 369-E, 44-L, 107-L
Plastic coatings. See Coatings, plastic
Plastic deformation. See also Structures, deformation
Plastic deformation, 28-M, 60-Q, 65-Q, 141-Q, 310-Q, 312-Q, 565-Q, 625-Q, 718-Q, 800-Q, 854-Q
book, 304-Q, 405-Q
grain-boundary effects, 315-M
heat evolution during, 725-Q
imperfection effects, 354-M
mechanism of, 578-Q
microscopy, motion-picture, 322-M
residual-stress effects, 749-Q
slip planes and dislocation energy, 761-Q
Plastic deformation (cont.)
of solids, 807-Q
of steels, 68-Q
stress effects on, 119-Q, 665-Q
surface-active-agent effects, 795-Q
surface effects in, 1007-Q
temperature effects, 931-Q
theory of, 281-F, 104-Q, 221-Q, 314-Q, 315-Q, 323-Q, 329-Q, 629-Q, 748-Q, 929-Q, 947-Q, 1089-Q
in V-notched bar in tension, 963-Q
x-ray method for study of, 96-M
Plastic-metal bonding. See Metal-plastic bonding
Plastic properties. See also Plastic deformation
Plastic properties, 46-G, 324-G, 1-Q, 162-Q, 352-Q, 353-Q, 355-Q, 547-Q, 562-Q
Plates. See Printing plates
Plating. See also Electrodeposition
Plating, 26-L, 117-L
Plating baths, 6-A, 7-A, 127-A, 128-A, 224-A, 237-A, 307-A, 358-A, 363-A, 379-A, 201-L, 312-L, 419-L, 569-L, 212-S
Plating industry, 126-A, 575-L, 678-L
Plating wastes, 183-A, 190-A, 207-A, 158-S
Platinum,
adsorption of oxygen on, 201-P
analysis of, 188-S
applications of, 112-V
brittleness of corroded ware, 560-Q
catalytic activity of, 580-P
corrosion of, 272-R, 310-R
corrosion resistance of, 112-V
creep of, 442-Q, 962-Q
electrode potentials, 343-P
electrodeposition of, 270-L
emissivity, thermionic, 207-P
fabrication of, 112-V
frictional properties of, 572-Q
mechanical properties of, 112-V
microstructure of corroded ware, 560-Q
oxide-film formation on, 30-R, 310-R
photonuclear reactions induced in, 405-P
physical properties of, 112-V
polishing of, 937-L
radiation absorption in, 370-P, 426-P
surface active properties of, 59-P
thermoelectric effect in, 599-P
viscosity during electrochemical polarization, 195-P
water-vapor adsorption on, 27-P
wear resistance of, 272-R
Platinum and alloys,
Gmelin's handbook, 34-V
Platinum alloys
cadmium, 152-M

Platinum alloys (cont.)
cobalt, 38-N
copper, 90-N, 413-P
gold, 258-N, 387-T
iron, 98-P, 159-P, 258-P, 260-P
lead, 154-M
rhodium, 442-Q
titanium, 246-M
zinc, 152-M
Platinum coatings, 764-L, 339-P, 447-P
Platinum electrodes, 231-P, 236-P, 342-P, 343-P
Platinum metals. See also Precious metals
Platinum metals, 95-A, 226-A, 565-P, 21-S, 275-T
Platinum plating, 216-L
Platinum wires, 480-P, 410-S
copper, 58-P
zinc, 311-P
Plutonium, 201-V
Plutonium sesquicarbide, 116-M
Poisson's ratio. See Elastic properties
Poland,
mineral resources of, 292-B
nonferrous metals in, 49-A
steel industry of, 292-B
Polarization, 319-P
Polarized-light microscopy. See Microscopy, polarized-light; or Microscopy, optical
Pole figures, 271-M
Polishing, 426-G, 15-L, 115-L, 506-L, 513-L, 711-L, 99-Q
Polishing compounds, 357-L
Polishing, electrochemical. See Electropolishing
Polishing, metallographic. See Metallography
Pollution. See Air pollution
Polonium, 280-P
Porcelain enameling. See Enameling, porcelain
Potassium, 43-P, 64-P, 153-P, 188-P, 539-P, 134-T
Potassium alloys,
sodium, 43-P, 247-T
Powder metallurgy. See also Metal powders
Powder metallurgy, 182-A, 300-A, 369-E, 126-H, 915-Q
book, 27-H, 55-H, 56-H
directory of industry, 59-H
economic trends in, 35-H
fundamentals of, 35-H
of heat-resisting alloys, 89-H
hot molding in, 86-H
magnetic parts by, 15-H
Powder metallurgy (cont.)
in office-equipment fabrication, 490-T
Plansee Seminar on, 119-H
in research, metallurgical, 97-H
review on, 23-H, 31-H, 33-H, 37-H, 79-H
sizing powder particles in, 22-H
in small parts production, 9-H
for spectrochemical-standard preparation, 237-S
Powder patterns, magnetic. See Structures, magnetic
Powdered-metal compacts. See Metal-powder compacts
Powdered-metal products. See also Metal-powder products
Powdered-metal products, 60-H, 444-L
Power-generation equipment 40-E, 142-R, 419-R, 132-T
Power-transmission equipment, 284-R, 309-R, 58-T, 98-T, 249-T, 262-T, 285-T
Prasodymium, 47-C, 297-P
Precious metals. See also Platinum metals
Precious metals, 192-A, 324-B, 141-C, 4-P, 23-T
Precipitation, 13-N, 198-N, 749-Q
Precipitation hardening. See Hardening, precipitation
Precision investment casting. See Investment casting
Precision measurement,
book, 218-S
Preferred orientation. See Structures, deformation
President's Materials Policy Commission, 244-A, 383-A
Presses, 36-G, 299-G, 301-G
Press forming,
for aircraft production, 361-G
book, 79-G
applications of, 17-G, 200-G, 204-G, 268-G, 437-G, 483-G
electronics in, 167-G
equipment for, 270-F, 435-G, 477-G, 266-G, 445-G
heavy duty, 46-F
hydraulic, 20-G
plastic flow in — book, 172-G
problems in, 366-G
at Reliance Electric and Engineering Co., 482-G
of steel, 92-G
welding of equipment for, 270-G
Pressure casting. See Die casting
Pressures, very-high, 276-P
Pressure vessels. See also Chemical equipment; Petroleum-refining equipment; etc.

Pressure vessels,
brass liners for, 212-R
flame cutting in, 696-K
forging in fabrication of, 696-K
fractures, explosive — of steel cylinders, 474-Q
graphitization of steels in, 86-Q
heat treatment in, 696-K
nondestructive testing of welds in, 153-S
pressing of, 330-G
stainless-steel cladding, 5-N
steels for, 356-K
stresses in, 332-Q, 658-Q
stress analysis of, 839-Q
stress relief of, 107-J, 793-K, 217-Q
testing of carbon steels for, 31-Q
trimming of, 330-G
welding of, 330-G, 279-K, 307-K, 352-K, 531-K, 663-K, 696-K, 738-K, 793-K
Printing, 801-L
Printing equipment, 97-T, 274-T, 325-T, 477-T, 478-T, 493-T, 521-T
Printing plates, 486-L, 225-T
Proportional limit. See Elastic properties
Protactinium, 519-L, 116-M
Protective coatings. See Coatings, protective
Punching. See Blanking and punching
Pulleys, 93-E
Pumps, 645-K, 368-Q, 540-R, 467-T
Punched cards,
book, 19-A
Pyrites, 59-B, 82-B, 100-B
Pyrometallurgy, 103-C
Pyrometers. See also Temperature measurement; Thermocouples
Pyrometers, 214-A, 8-S, 22-S, 23-S, 49-S, 93-S, 122-S, 130-S, 147-S, 406-S
Pyrometry, 4-S, 42-S, 125-S, 156-S

Qualitative analysis. See Analysis; Spot testing
Quality control. See also Gaging; Inspection; Nondestructive testing
Quality control, 319-S, 474-S, 493-S, 506-S, 544-S
at Pantex Mfg. Co., Pawtucket, R.I., 278-S
statistical, 377-S, 428-S, 489-S
in aircraft industry, 429-S
of automotive stampings, 424-S
book, 306-S
Quench hardening. See Hardening, quench
Quenching, 127-J, 221-J
Quenching media, 22-J, 53-J, 154-J

Radar equipment, 7-T, 31-T
Radiation, 370-D, 49-P, 109-S, 164-S, 67-T
Radio equipment, 8-T, 551-T
Radioactive ores. See Ores, radioactive
Radioactive tracers,
application of, 94-S, 152-S, 215-S, 284-S, 292-S, 501-S
for casting inspection, 191-S
for cleaning-agent evaluation, 977-L
in corrosion research, 149-R, 190-S, 501-S
for cutting tool life measurement, 105-G, 453-G
in detection of defects in ceramic-coated steels, 241-L
in diffusion study of silver electrodes, 221-N
laboratory design for handling — book, 381-A
in metallurgical research, 386-P
in nondestructive testing, 110-S
in ore-concentration studies, 344-B, 365-B
physical properties of, 349-S
in steelmaking, 178-D, 190-S, 488-S
in surface-cleaning research, 501-S
U.S. distribution of — book, 421-S
in wear studies, 1021-Q, 501-S
Radiography. See also Nondestructive testing
Radiography, 25-M, 184-M, 40-S, 201-S, 260-S, 342-S, 482-S
alpha-ray, 360-M
applications of, 155-S, 213-S, 284-S
auto, 76-M
beta-ray, 18-S
book, 267-S
gamma-ray, 209-S, 250-S, 282-S, 433-S
weld, 494-S
xero, 7-S
x-ray, 209-S, 250-S, 282-S, 413-S
Railroad cars,
aluminum and alloys in, 151-T, 153-T, 232-T, 266-T, 267-T, 285-T, 289-T, 333-T
coatings for, 903-L
cutting, acetylene-oxygen, 551-K, 570-K
steels for, 26-T
welding of, 221-K, 321-K, 335-K, 551-K, 570-K, 614-K, 746-K
wheel fabrication for, 168-F
Railroad equipment 193-R, 384-R, 66-S, 480-T
Railroad rails
corrosion of, 342-K, 391-R
defects in, 786-Q

Railroad rails (cont.)
failures of, 136-S, 137-S, 139-S
fractures of edges, 391-R
hardening, flame, 180-J
improvements in support for, 255-Q
mechanical properties of, 108-F
nondestructive testing of, 135-S, 138-S, 174 S, 302-S
rolling of, 108-F, 204-F, 327-F, 786-Q
sawing of, 675-K
service tests for, 256-Q, 257-Q
shelly spots in, 258-Q
steels for, 305-T, 421-T
stresses in, 260-Q
welding of, 38-K, 190-K, 254-K, 256-K, 342 K, 675-K, 808-K
Rare earths, 278-A, 190-B, 207-B, 244-B, 9-F, 31-S, 115-V
Rare metals, 185-B, 207-B, 47-C, 105-C, 122-C, 500-Q, 167-V
Reaming. See Drilling and reaming
Recrystallization, 28-M, 9-N, 75-N, 123-N, 193-N, 273-N, 313-N, 322-N, 749-Q
Rectifiers, 462-T
Reduction. See Smelting; etc.
Reduction, electrolytic, 342-P
Refining, 60-C, 70-C, 146-C, 292-S
Refractories, 301-B, 792-L
American vs. British, 318-B
basic — book, 36-B
corrosion of, 327-B
for cupola furnaces, 413-E, 474-E
for furnaces, metallurgical, 302-B, 309-B
for glass tanks, 301-B
heat resistance of, 1-B
for high temperatures, 284-B
iron determination in, 451-S
for openhearth furnaces, 269-D, 365-D
for oxidation resistance, 194-R
slags of iron silicate in, 263-B
specifications for — ASTM, 249-B
for steel plants, 227-B, 339-B, 271-D, 423-E
for steelmaking, 328-B, 89-D
for steelmaking ladles, 33-D, 49-D
Refractory coatings. See Coatings, ceramic; or Enameling, porcelain
Refractory metals. See also Heat-resisting alloys
Refractory metals, 107-H
Refrigerators and freezers, 440-G
Relaxation. See Creep; Creep strength; or Stress relief
Replica techniques. See Microscopy
Research, industrial, 25-A, 132-A, 147-A, 289-A, 97-H
Research laboratories, 368-A
American Steel Foundries, East Chicago, Ind., 537-E, 612-E
of Associated Electrical Industries Ltd., 64-A
Babcock and Wilcox, 261-A
British Cast Iron Research Asso., 654-E
British Iron and Steel Research Asso., 377-A
British Welding Research Asso., 377-A
for coatings, protective, 809-L, 810-L
in foundry practice — Purdue Univ., 567-E
of Great Britain — book, 173-A
Hughes Tool Co., Houston, Texas, 279-A
Istituto Sperimentale dei Metalli Leggeri, 266-A
Massachusetts Institute of Technology, 372-A
metallurgy — South Africa, 276-A
for metal and mineral industries, 263-A
mission to Europe, 150-A
Polytechnic Institute of Milan, 243-A
Swinden Laboratories, Rotherham, 311-A
of United States, 79-A
book, 168-A
Residual stresses. See Stresses, residual
Resilience. See Elastic properties
Resistance, electrical. See Resistivity
Resistance welding. See Welding, resistance
Resistivity, 4-M, 84-P, 95-P, 267-P, 460-P, 579-P, 141-Q
Rhenium, 124-C, 170-C, 455-P, 583-P, 517-S
Rhenium alloys
cobalt, 171-L
iron, 171-L
palladium, 573-P
Rheology, 60-Q, 620-Q
Rhodium, 253-P, 88-S, 188-S, 112-V
Rhodium alloys,
palladium, 514-P
Rhodium plating, 30-L, 515-L, 664-L
Rigging. See Foundry rigging
Risers. See Foundry rigging
Rivets, 11-G, 408-K, 305-S, 459-S, 485-T
Riveting, 437-G, 328-K, 408-K, 682-K, 44-S
Roasting, 146-C
Rockets, 35-Q
Rockwell testing. See Hardness testing
Rod drawing, 55-F
Rod milling. See Milling, rod
Rods, welding. See Welding rods; or Welding electrodes
Rolls, 343-E
Rolling,
American vs. British practice, 166-F
of angle iron, 138-F
barrel. See Tumbling
of billets, 201-F

Rolling (cont.)
calculations for, 247-F
cold, 90-F, 158-F, 159-F, 241-F, 295-F, 433-G
defects incurred by, 112-F
deformation in, 204-F, 929-Q
friction calculations for, 263-F
of metals, 151-F, 495-T
pressure distribution in, 131-F, 160-F
of rails, 54-F
in railroad-car-wheel fabrication, 168-F
roll-pass diagrams for, 1-F
strip-tension measurement in, 266-F
temper, 196-F
temperature control and instrumentation for, 4-F
theories of, 26-F, 45-F, 69-F, 71-F, 136-F, 222-F, 260-F, 331-F
Rolling mills, 78-F
Abbey works, 77-F
Alan Wood Steel Co., 194-S
for aluminum sheets, thin, 233-F
in Belgium, 299-F
cold, 17-F, 147-F, 148-F
Commission of Engineers for, 93-F
continuous hot-strip, 285-F
controls and drives for, 5-F, 95-F, 314-F
cooling beds for bar-type, 18-F, 230-F
electrical equipment — d.c., 229-F
in France, 299-F
furnaces for, 180-F
for iron and steel, 167-D
lubrication of, 30-F
for magnesium sheets, 258-F
operation of, 136-F
punched-card analysis of data, 247-S
research practices of, 202-F
rod, 203-F, 257-F
roll fabrication for, 496-T
sheet, 64-F
slab, 52-F
South African Iron & Steel Industrial Corp., 251-F
for steel bars, 203-F
for steel sheets, 234-F, 261-F, 284-F
strip, 64-F, 141-F, 250-F, 267-F, 287-F, 313-F
tandem cold reduction, 100-F
tension and gage control in, 260-F
Trostre Works, 102-F
width gage for hot-strip, 231-F
Rolling-mill rolls, 80-F, 401-G
Rolling textures. See Structures, deformation
Romania,
mineral resources of, 292-B
Rotary furnaces. See Furnaces, rotary
Roughness. See Surface finish
Rubber coatings. See Coatings, rubber
Rubber-metal bonding. See Metal-rubber bonding
Rubidium, 320-L, 132-P, 177-P, 267-P
Rubidium alloys,
calcium, 107-P
Runners. See Foundry rigging
Ruptures. See Failures or Fractures
Rupture testing. See Fracture testing
Russia,
foundry industry of, 290-E
machine tools in, 467-G
nonferrous metals — book, 307-S
tractor fabrication in, 335-T
welding in, 522-K
Rust. See Corrosion; Iron oxides
Rust preventives. See Corrosion inhibitors
Rust-preventive coatings. See Coatings, corrosion-preventive
Ruthenium, 253-P, 550-P, 112-V

S-816 alloy. See Cobalt alloys, chromium-columbium-iron-molybdenum-nickel-tungsten
SAE handbook (1952), 368-S
Salt baths. See Heat-treatment media
Salt corrosion. See Corrosion, sea-water
Salt-spray testing, 95-R, 115-R, 184-R
Salt-water corrosion. See Corrosion, sea-water
Sampling
book, 281-B, 423-S
equipment for, 469-S, 546-S
of metals and ores, 249-S, 445-S
methods and theory, 469-S, 546-S
military standards for, 425-S
of solid materials, 125-B
Sand blasting. See Blasting, abrasive
Sandwich structures, 279-G
Saws, band, 68-K
Sawing, 466-G, 481-G
Scale removal. See Descaling; or Pickling
Scaling, 302-R, 467-R
Scheelite. See Tungsten ores
Schnadt toughness test, 228-Q
Scleroscope hardness. See Hardness; or Hardness testing
Scoring resistance. See Wear resistance
Scrap iron. See also Steel scrap
Scrap iron
cupola melting of swarf, 317-E, 318-E, 325-E, 362-E, 373-E, 404-E, 473-E
for cupola process, 358-E
economic trends, 111-A
iron-powder production from, 58-H

Scrap iron (cont.)
statistics for, 129-A, 117-E
Scrap metals, 18-A, 77-A, 93-A, 194-A, 27-B, 36-C
Scrap steel. See Steel scrap
Screws, 459-S, 453-T
Screw threads, 548-K
Screwing. See Fasteners
Screws. See Fasteners
Seam welding. See Welding, seam
Sea-water corrosion. See Corrosion, sea-water
Season cracking. See Stress corrosion
Secondary metals. See Scrap metals
Sectioning. See Metallography
Selenium,
coatings for, 248-P
conductivity, electrical, 225-P, 124-P
expansion, thermal, 180-P
as magnesium-alloy coating, 472-L
mercury diffusion into, 85-N
recovery from dusts and fumes, 124-A
structure, crystal, 222-M, 420-M
thermal instability of, 547-P
transformations of, 247-M, 156-N, 289-N
vapor pressure of, 66-P
Selenium alloys,
thorium, 359-M, 391-M
Selenium single crystals, 247-M
Self diffusion. See Diffusion
Semiconducting materials, 124-P
Service failures. See Failures
Servomechanisms, 400-S, 401-S
Shafts, 120-L, 773-Q
Shears, 848-L, 439-T
Shear strength, 564-Q
Shear testing, 822-Q
Shearing, 29-F, 204-G, 277-G, 438-G
Sheet iron, 112-H, 370-L
Sheet metals,
analysis, spectrographic, 280-S
bending of, 223-G, 225-G, 503-G
book, 322-G
coatings for, 245-L, 251-L, 350-L, 949-L
corrosion, atmospheric, 273-R, 318-R, 327-R, 329-R, 438-R
diffraction by, 363-M
drawing dies for, 211-G
drawing of — theory, 273-G
fabrication of — book, 322-G
forming of, 177-G, 289-G, 316-G, 318-G, 332-G, 393-G, 395-G, 398-G, 400-G
forming equipment for, 299-G
pressworking of, 225-G
printing on flanged parts, 801-L
punching of, 291-G
riveting of, 682-K
rolling of, 33-F, 40-F, 207-F
Sheet metals (cont.)
shearing of, 225-G
stamping of, 57-G, 459-G
stitching of, 33-K, 414-K, 628-K
thickness measurement of, 398-S
transfer of wood grain to, 618-L
welding of, 143-K, 592-K
working of, 222-G
Sheet steel. See also Steel sheets
Sheet steels, 463-K, 925-Q
Shell molding, 478-E, 496-E, 554-E, 592-E
applications of, 316-E, 405-E, 505-E
developments in, 331-E
gating practice for, 487-E
research at Westinghouse, 294-A
resins, synthetic, 577-E
Shell-molding process, 13-E, 14-E, 31-E
Ships,
aluminum in, 404-T, 435-T, 470-T, 516-T, 518-T
aluminum and alloys in, 349-T, 350-T, 363-T, 371-T, 372-T, 373-T, 374-T, 375-T, 392-T, 416-T, 92-T, 123-T, 141-T, 155-T, 170-T, 203-T, 223-T, 498-T
aluminum alloys in, 258-T, 264-T, 338-T, 495-T
aluminum spraying of, 906-L
cathodic protection of, 45-R, 92-R, 197-R, 213-R, 435-R
coatings, paint, 768-L, 883-L, 45-R, 92-R
corrosion of, 45-R, 92-R, 388-R
corrosion prevention of, 521-R
failures in, 353-K, 162-S, 330-S
fractures of welds in, 910-Q, 457-S
magnesium and alloys in, 349-T, 371-T
riveting, 225-K
steel, 516-T
strength testing of structural members, 913-Q
stresses in, 252-Q, 254-Q, 280-Q, 695-Q
titanium in, 158-V
welding of, 12-K, 93-K, 207-K, 215-K, 451-K, 533-K, 575-K, 701-K, 742-K, 759-K
welding,
arc, 386-K, 652-K, 683-K
fillet, 225-K
shot, 225-K
spot, 225-K
thermit, 639-K
zinc spraying of, 906-L
Shock testing. See Impact testing
Shortness, cold. See Brittleness or Toughness
Shortness, hot. See Plastic properties
Short-range order. See Structures, crystal

Shrink fitting, 60-K
Signal Corps, 51-T
Silica, 98-C, 215-D
Silica refractories, 25-S
Silica system,
chromium oxide – ferrous oxide, 416-M
Silicates, 350-R
Silicides, 118-V, 134-V
Silicon,
aluminothermic production of, 98-C
atomic weight of, 165-M
on ceramic oxides – wettability of, 492-P
conductivity, electrical, 278-P
determination of, 268-S, 348-S, 447-S
diffusion in molten iron, 161-N
electromotive force of, 409-P
electron mobility in, 222-P
in electronic equipment, 567-T
expansion, thermal, 165-M
hardness, hot, 113-Q
melting of undoped ingots, 95-C
production by reduction of silica, 91-C
properties of, 594-P
proton-scattering cross section, 269-P
thermodynamic properties of, 61-P
twinning in, 85-M
Silicon alloys,
aluminum-iron, 244-N, 245-N, 484-P
aluminum-manganese, 334-M
cobalt, 461-P
copper, 529-Q
iron,
phase diagrams of, 1-N, 244-N, 422-P
molybdenum, 651-L, 254-M
nickel, 146-M
titanium, 147-C
tungsten, 458-M
zirconium, 387-M
Silicon bronzes. See Bronzes, silicon
Silicon carbide, 175-M, 177-M, 107-N, 118-N, 218-N
crystal growth on, 196-M
diffraction, X-ray, 347-M
electric-furnace production, 120-C
grain growth, spiral, 151-N
grinding of, 33-G
growth of crystals around obstacles, 409-M
hardness anisotropy of, 33-G, 145-Q
production of, 120-C, 66-H
properties of, 66-H
Silicon cast irons. See Cast irons, alloy, silicon
Silicon coatings,
vacuum-deposited, 442-P, 445-P, 525-P
Silicon ferrite, 164-M
Silicon irons. See Cast irons, alloy, silicon
Silicon-nitrogen system, 86-M
Silicon steels. See Steels, alloy, silicon
Siliconizing, 276-J
Silumin. See Aluminum alloys, silicon
Silver,
application of, 112-V
bismuth plating of – monoatomic layers, 847-L
brazing. See Brazing, silver
cathodic sputtering of, 47-L, 242-N
coating of – chemical, 360-L
coatings, vapor-deposited, 123-M, 389-P
condensation of vapor, 40-P
conductivity, electrical, 278-P, 556-P
in copper – creep and softening effects, 10-Q, 484-Q, 897-Q
corrosion of, 315-P, 231-R, 349-R, 450 R, 509-R
corrosion resistance of, 112-V
creep of, 962-Q
determination of, 35-B, 363-S, 486-S
diffusion into gold, 89-P
diffusion
grain-boundary, 231-N
self, 168-N, 290-N
economic trends, 95-A, 109-A, 226-A
elasticity modulus of, 349-Q
electrical properties of colloidal, 298-P
electrode potential of, 280-P, 315-P, 338-P
electrodeposition on plastics, 61-L
electron emission from, 415-P
electropolishing of, 788-L
embossing of, 409-T
expansion, thermal, 83-P
fabrication of, 112-V
film formation on, 348-R
frictional properties of, 572-Q
impregnation into carbon, 570-T
light absorption of, 113-P
magnetic properties of, 150-P
mechanical properties of, 112-V
mechanical properties, 144-Q
melting, suspension, 495-E, 578-E
metal spraying, 311-L
neutron cross section of, 47-P
oxidation, high-temperature, 49-R
oxygen adsorption on, 79-P, 308-P
passivation of, 243-R
physical properties of, 144-Q, 112 V
plastic deformation of, 1023-Q
polishing of, 937-L
proton-scattering cross section, 269-P
radiation absorption in, 426-P
reaction with liquids, 231-R
recovery of, 145-B
recovery from gold ores, 56-B
recovery from Pb-Zn ores, 287-B, 329-B

Silver (cont.)
recovery from zinc ores, 93-C
recrystallization in, 61-N
refining of, 334-A
resistivity of, 4-P, 563-P, 570-P
solubility in aluminum, 306-N
solution heat in molten tin, 500-P
structure, crystal, 272-M
surface tension of, 11-P, 259-P, 308-P, 441-P
tarnishing of, 61-R, 79-R
thermodynamic properties of, 46-P
twinning of, 476-M
vacuum deposition of, 545-L, 22-N
vapor deposition from plated heating elements, 765-L
vapor pressure of, 40-P
viscosity of, 153-P, 195-P
waste liquors of refinery for, 166-A
water-vapor adsorption on, 27-P
wear resistance of, 973-Q
welding, resistance, 99-K
Silver alloys,
aluminum, 320-M, 248-N, 325-N, 49-R
aluminum-magnesium, 325-N
antimony, 325-N
cadmium, 325-N, 529-Q
cadmium-copper-zinc, 76-K
cadmium-magnesium, 325-N
conductivity, thermal, 536-P
copper, 329-M, 97-Q, 347-Q
copper-gold, 345-P
gold, 46-P, 107-P, 158-P, 194-P, 500-P, 597-P
indium, 529-Q
lead-zinc, 205-M
magnesium, 597-P
magnesium-tin, 297-N
magnesium-zinc, 297-N
nickel, 122-P
palladium, 252-N, 226-P
resistivity of, 367-P
tin, 947-L, 529-Q
titanium, 256-M
Silver cathodes,
hydrogen evolution from, 236-P
Silver coatings,
on glass, 446-P
magnesium fluoride, 448-P
on nonmetallic materials, 415-M
production and applications of thin, 764-L
refractive-index of, 39-P
vacuum-deposited, 545-L, 581-L, 733-L, 735-L, 442-P
resistivity of, 37-P
Silver electrodes, 221-N
Silver electrodeposits, 786-K, 160-L, 504-L, 822-L, 186-M, 845-Q, 510-R
Silver films, 545-P, 566-P, 933-L
Silver foils, 407-P
Silver-glass bonding, 528-T
Silver ores,
concentration of, 13-B, 17-B
copper-gold-lead-zinc, 58-B
crushing and grinding of, 13-B
cyanidation of, 196-B, 126-C
flotation of, 13-B, 17-B, 196-B
gold, 1-C
leaching of, 17-B
reduction of, 28-C
Silver plate, 7-L, 120-R, 340-T
Silver plating, 29-L, 414-L, 439-L, 612-L, 822-L, 863-L, 993-L, 426-S
Silver powders, 14-H, 94-H
zinc, 10-P
Silver single crystals, 39-M, 217-M, 472-M, 298-N, 146-P
Silver solder, 151-K
Silver-silver nitrate system, 168-N
Silver-water system, 315-P
Silver-zinc system, 141-M
Silver wires, 265-P, 311-P
Single crystals. See also Crystals, single
Single crystals,
metallic
adsorption of gases on, 204-P
creep tests on, 208-Q
diffraction, x-ray, 434-M
elastic constants of, 780-Q
growth of, 35-M, 43-M, 242-M, 32-N, 115-N, 250-N, 42-Q
orientation determination of, 211-M
plastic deformation of, 189-Q, 190-Q, 717-Q, 780-Q, 994-Q
slip in, 313-M
vibration damping of, 780-Q
yield point of, 312-Q
Sintering, 119-C, 9-D, 33-H, 95-H, 106-H, 36-J, 167-J, 283-N
Size reduction. See Crushing and grinding
Sizing, 223-B
Slags, 542-P
alumina determination, spectrographic, 25-S
analysis, spectrographic, 272-S
clay-content effects, 42-B
conductivity of, 257-B
conductivity, electrical, 127-B
electrochemical studies of, 253-B
equilibria of, 229-B, 268-B
ferrous, 288-B, 451-S. See also Steelmaking slags, Blast-furnace slags; etc.
fluorine determination, spectrographic, 412-S

Slags (cont.)
manganese and oxygen distribution in, 262-B
pumice-type, 222-B
refractometry of, 326-B
sodium oxide bearing — phase diagrams, 426-M
Sliding contact, 34-Q
Slip patterns. See Structures, deformation
Smelting, 164-A, 3-B, 146-C, 292-S
Smoothing. See Electropolishing
Soaking pits, 309-B, 153-F, 232-F, 430-S
Soaking-pit practice, 5-D, 28-F, 36-F, 197-F, 312-F
Sodium,
conductivity
electrical, 28-P, 227-P
thermal, 28-P, 64-P, 227-P
as a coolant, 185-R, 134-T
determination of, 31-S
elastic properties, 486-Q
expansion, thermal, 83-P
molten, 247-T
reaction heats with water, 43-P
resistivity of, 188-P
viscosity of, 153-P, 539-P
Sodium alloys,
aluminum-germanium, 408-M
lanthanum, 207-M
lead, 163-M, 188-N
lead-mercury, 344-P
potassium, 43-P, 247-T
tin, 74-P
Softening, flame, 39-J
Soil corrosion. See Corrosion, soil
Solders. See also Soldering
Solders, 199-K, 296-K, 775-K, 167-N, 585-Q, 426-R, 12-S, 531-T, 160-V
Soldered joints, 66-K, 167-N
Soldering, 167-J, 66-K, 121-K, 152-K, 280-K, 334-K, 496-K, 510-K, 579-K, 715-K, 775-K, 786-K, 201-T
Solid-phase transformations. See Transformations
Solid solutions, 4-M, 138-M, 412-M, 24-N, 279-N, 282-N, 529-Q
Solid-state reactions, 36-H
Solidification. See also Crystallization, Recrystallization
Solidification, 565-Q
Sonic vibrations. See Vibrations, sonic
Sorting, 64-S, 445-S, 540-S
South Africa,
antimony production in, 312-A
gold-ore concentration in, 332-B
lead ores resources in, 70-B
mercury ores resources in, 70-B
steel industry of, 275-A, 173-D
South African Iron and Steel Industrial Corp., 206-A, 291-A, 251-F
Space-heating equipment. See also Furnaces; Stoves
Space heating equipment, 428-R, 474-T
Spain,
steel industry in, 84-B
Specific heats, 199-P, 463-P
Specifications, 116-S
ASTM, 115-S
for Australian metals industry, 114-S
engineering tolerances — book, 217-S
U.S. Government, 508-S
for welded construction — book, 128-S
Spectrochemical analysis. See Analysis, Spectrographic
Spectrographs, 331-S, 356-T
Spectrographic analysis. See Analysis, spectrographic
Spectrometers,
infrared, 324-S
mass, 453-S
Spectrometric analysis. See Analysis, spectrographic
Speculum,
separation, chemical, 76-C
Speculum plating. See Tin plating, copper
Spheroidal cast iron. See Cast iron, nodular
Spinning, 346-G, 380-G
Sponge iron, 29-D, 248-D
Spot testing, 76-S
Spot welding. See Welding, spot
Spray coatings, See Coatings, paint spray; or Coatings, sprayed metal
Springs,
applications of steel, 113-V
copper alloys in, 347-T
fabrication of steel, 113-V
failures of, 375-S
heat treating of, 303-F, 190-J, 113-V
manufacture of, 303-F
mechanical properties of, 1003-Q
metals and alloys for, 276-T, 299-T
peening of, 190-J
residual stresses in, 205-J
steels for, 851-L, 842-Q
stress-strain properties of, 367-Q
substitutes for scarce materials for, 231-Q
for transmitters, 526-T
types of, 135-T
Spring alloys, 299-T
Spring steels. See Steels, spring
Sprues. See Foundry rigging
Sputtering, cathodic, 734-L, 242-N
Stability, dimensional, 749-Q

Stainless steels, 10-V
in aircraft, 200-F, 234-T, 252-T, 379-T
analysis, spectrographic, 526-S
annealing of, 384-G, 64-J, 172-J, 1050-Q
annealing furnace for, 182-J
applications of, 513-R, 2-T, 3-T, 66-T, 165-T, 236-T, 238-T, 332-R, 340-T, 346-T, 384-T, 453-T, 10-V, 62-V, 176-V
Ar^{111} point in, 63-N
austenite decomposition, 74-N, 131-N
austenite transformation in, 204-N
bend strength of, 719-Q
blasting, shot, 623-L
bolt inserts, 422-T
brazing of, 124-K, 135-K, 455-K, 662-K, 740-K, 763-K, 777-K, 785-K, 791-K
brittleness of, 410-Q
in buildings, 244-T, 344-T, 437-T
carburizing of, 234-J
casting of, 12-E, 52-E, 77-E, 247-E, 490-E, 513-E
cathodic protection of, 89-R
cerium in — workability effects, 12-F
in chemical equipment, 129-T, 271-T
chromium,
in aircraft, 161-V
annealing of, 64-J, 172-J
applications of, 253-T, 161-V
austenite transformation in, 63-Q, 828-Q
brazing of, 644-K, 161-V
chemical properties of, 48-Q
corrosion, intergranular, 297-R, 304-R
corrosion resistance of, 539-R, 161-V
drawing, deep, 161-V
embrittlement at high temperatures, 63-Q, 828-Q
fabrication of, 253-T, 161-V
forming of, 303-G
hardening of, 28-N
mechanical properties of, 48-Q, 253-T
polishing of, 644-K
substitution of Cr-Ni types, 161-V
transformations of, 16-N, 28-N
weldability of, 161-V
welding of, 644-K, 161-V
chromium carbides in, 192-M
chromium, ferritic, 22-D
chromium-molybdenum, 348-M, 25-R
chromium-molybdenum-nickel, 331-M
chromium-nickel, 216-M, 178-N, 856-Q, 30-V
chromium-nickel-molybdenum-titanium, 253-N
chromium-nickel-tungsten, 511-Q
clad, 67-V
cleaning of, 315-G, 384-G, 2-L, 65-L, 76-L, 190-L, 546-L, 872-L, 939-L

Stainless steels (cont.)
coatings for, 39-A, 20-L, 35-L, 98-L, 136-L, 487-L, 502-L, 701-L, 704-L, 842-L, 884-L, 975-L, 51-S
columbium determination, spectrographic, 391-S
compositions of, 62-V
compressive strength of sandwich plates, 457-Q
conductivity,
electrical, 210-P
thermal, 210-P, 358-P
conservation of, 160-A
conversion to non-nickel, 539-R
copper, 372-R, 208-V
copper-clad, 497-Q
corrosion of, 99-R, 393-R, 519-R, 535-R, 189-V
corrosion,
acid, 112-R, 143-R, 151-R, 276-R, 301-R, 423-R, 466-R, 532-R
aqueous, 227-R
chemical, 44-R, 276-R, 378-R, 21-V
gaseous, 509-R
intergranular, 111-K, 32-R, 51-R, 179-R, 424-R, 454-R, 471-R
marine, 388-R
salt, 215-R, 423-R
steam, 386-R
corrosion cracking of, 496-R
corrosion inhibitor for, 11-R, 172-R
corrosion prevention of, 546-R
corrosion resistance of, 218-J, 562-K, 76-R, 183-R, 372-R, 541-R, 527-R, 70-V, 108-V, 176-V, 195-V
corrosion testing of, 434-R, 436-R, 513-R
creep of, 670-Q, 835-Q
creep-rupture of, 606-Q, 989-Q
creep strength of, 670-K, 461-Q, 868-Q, 870-Q, 924-Q, 944-Q, 956-Q
creep testing of, 1088-Q
decarburization of, 375-S
dendritic growth in, 80-N
drawing of, 500-G
drilling and reaming of, 125-G, 394-G
ductility of, 410-Q, 676-Q, 907-Q, 956-Q
effect on oxidation of lubricating oils, 381-P
elastic properties of, 956-Q
elasticity modulus of, 605-Q, 879-Q, 454-R, 907-Q
electrodeposition on, 789-L
electropolishing, 296-L, 524-L, 696-L, 715-L, 716-L
embrittlement of, 192-Q, 999-Q, 1014-Q
emissivity, thermionic, 207-P
for engines, jet, 441-G, 502-T

Stainless steels (cont.)
etchants, metallographic, 307-M, 351-M
exothermic feeding compound for, 416-E
extra-low-carbon, 97-K, 15-T
extrusion of, 144-F, 171-F, 198-F, 205-F, 208-F, 228-F
fabrication of, 159-J, 189-V, 176-V
fatigue strength, 907-Q
fatigue testing of, 491-Q, 1043-Q, 1088-Q
finishing of, 190-L, 772-L, 842-L, 872-L
flame cutting of, 414-G, 491-G, 495-G, 696-K
in food processing equipment, 235-T, 446-T
forging of, 193-F, 207-J, 696-K
formability of, 384-G
forming of, 215-G, 224-G, 287-G, 313-G, 315-G, 384-G, 416-G, 423-G, 293-T, 525-T
in foundry furnace, vacuum, 15-E
foundry practice, 111-E
fracture strength of, 924-Q
frictional properties of, 582-Q
graphitization of, 924-Q
grinding of, 390-G
hardening of, 45-J, 159-J
hardness of, 218-J, 266-M, 274-N, 870-Q
hardness, surface, 515-Q
hardness testing of, 870-Q
heat resistance of, 189-V
heat treatment of, 11-J, 45-J, 173-J, 207-J, 244-J, 250-J, 261-J, 696-K, 375-S, 176-V
high-speed heating, 109-F
for high temperatures, 956-Q
honing of, 204-L
hot topping of ingots, 222-D
hydrogen determination in, 319-F
identification, chemical, 81-S
impact strength of, 893-Q, 907-Q, 956-Q
inclusions in, 165-D
for investment casting, 18-E, 281-T
joining of, 5-K, 497-K, 559-K
lanthanum, 12-F
for low temperatures, 893-Q
machinability of, 517-G, 70-V
machining of, 3-G, 39-G, 51-G, 390-G, 470-G, 509-G, 515-G, 525-T
magnetic properties of, 130-M, 169-P, 571-P
manganese determination, spectrographic, 447-S
martensite transformation in, 89-N
mechanical properties of, 159-J, 261-J, 494-Q, 835-Q, 893-Q, 903-Q, 907-Q, 956-Q, 339-T, 527-T, 62-V, 108-V, 195-V
mechanical properties vs. microstructure, 251-M
Stainless steels (cont.)
mechanical testing of, 434-R
in medical equipment, 237-T, 290-T
melting of, 61-D
melting of, 61-D, 189-D, 261-D, 490-E
microstructural instability at high temperatures, 205-M
microstructure of, 209-G, 218-J, 350-M 378-M, 944-Q, 176-V
nickel, 183-N
notch effects on, 673-Q
oxide films on, 450-M
passivity of, 247-R, 528-R
permeability, magnetic, 380-P
phase diagrams of, 146-D, 378-M
phosphating of, 375-S
physical properties of, 159-J, 189-V
pickling of, 11-J, 45-J
pitting of, 11-R, 51-R
plastic deformation of, 470-G
plating of, 375-S, 161-V
Poisson's ratio for, 605-Q, 879-Q
polishing of, 390-G, 190-L, 716-L, 872-L, 937-L, 515-Q
porous, 98-H
potentials in sea water, 369-R
powder cutting of, 45-G, 66-G
precipitation of, 1050-Q
pressworking, 441-G, 207-J
properties of, 21-V, 62-V, 176-V
quenching of, 75-J
rare earths in, 9-F, 115-V
rare-earth effects, 190-B
refining with oxygen, 189-D
Republic Enduro, 176-V
resistivity of, 570-P
rolling of, 261-F, 311-F, 157-G
scaling of, 679-K
shear modulus of, 879-Q
shear strength of, 605-Q
shell molding of, 422-E, 440-E, 454-E, 508-E, 562-E
shock resistance, thermal, 51-S
sigma formation in, 274-N, 410-Q
silicon determination, spectrographic, 447-S
sodium in contact with, 185-R
soldering of, 315-G, 611-K
for springs, 842-Q, 375-S
stamping of, 287-G
standards, 79-S
strength properties of, 679-K, 676-Q, 868-Q, 907-Q
strength properties vs. hardness, 956-Q
stress corrosion of, 494-R
stress relief of, 107-J, 261-J
stress-strain properties, 835-Q

Stainless steels (cont.)
structure, crystal, 192-M
substitutes for, 306-A
supply situation, 129-A
surface preparation for plating, 611-L, 789-L
tantalum determination, spectrographic, 391-S
tempering of, 218-J, 28-N
tensile strength of, 835-Q, 870-Q, 924-Q, 1004-Q
tensile testing of, 1004-Q
thermal shock tests for, 246-Q
thread inserts of, 104-G, 18-T, 458-T
tin plating of, 451-Q
titanium, 112-R
titanium alloys in production of, 146-D
titanium in silver soldering, 237-K
titanium-stabilized, 777-Q, 393-R
transformations of, 255-N, 956-Q, 176-V
transition zone, 773-K
in turbines, 196-R, 61-T, 80-T, 148-T, 149-T, 169-T, 218-T, 337-T, 145-V
wear of, 70-V
wear testing of switch contacts, 519-Q
weld deposits of, 140-K
weld tests of, 261-J
weldability of, 138-K, 227-K
welding of, 159-J, 159-K, 177-K, 210-K, 242-K, 252-K, 260-K, 281-K, 304-K, 351-K, 426-K, 679-K, 762-K, 791-K, 796-K, 730-L, 10-V
welding,
arc, 7-K, 192-K, 198-K, 246-K, 490-K, 531-K, 645-K, 666-K, 696-K, 795-K
butt, 111-K
flash, 228-K, 554-K
gas, 562-K
gas-shielded-arc, 209-K, 446-K, 562-K, 622-K, 657-K, 807-K
helium-arc, 105-K, 807-K
resistance, 99-K, 131-K, 666-K, 764-K
seam, 302-K, 790-K, 525-T
spot, 19-K, 302-K, 361-K, 362-K, 392-K, 476-K, 562-K, 710-K, 731-K, 790-K, 525-T
spot and seam, 416-G, 423-G
submerged-arc, 75-K, 752-K
workability of, 9-F, 12-F, 327-G
yield strength at high temperatures, 835-Q
Stainless steel bars, 373-Q
Stainless steel blades, 381-Q
Stainless steel castings, 206-E, 555-E, 641-E, 645-K, 629-L, 475-R
chromium, 161-V
chromium-nickel, 161-V
Stainless steel-copper laminates, 709-K
Stainless steel ingots, 92-D
Stainless steel pipes, 28-G, 390-K, 615-K, 776-Q, 420-S
Stainless-steel plates, 698-K
Stainless steel powders, 3-H, 90-H, 99-H, 401-P
Stainless-steel-powder compacts, 3-H, 99-H
Stainless-steel powder products, 3-H, 99-H
Stainless steel sheets, 84-F, 85-J, 24-K, 354-K, 448-K, 485-K, 149-L, 230-T
Stainless steel strips, 85-J, 233-T
Stainless-steel tubing,
annealing of, 253-F, 280-F
applications of, 161-V
corrosion of, 308-R, 387-R
drawing, cold, 253-F, 280-F
forming in jet-engine fabrication, 441-G
forming, rubber-pad, 461-G
for high temperatures, 161-V
production of, 253-F, 280-F
properties of, 161-V
welding of, 17-K, 92-K
Stainless-steel welds,
corrosion of, 13-R, 52-R, 211-R, 424-R, 447-R
corrosion-preventive treatment of, 893-Q
heat treatment of, 447-R
low-carbon, 97-K, 467-K
mechanical properties of, 400-K, 666-K
microstructures of, 400-K, 666-K
stresses, residual, 490-K
tensile strength of, 481-Q
Stainless-steel wires, 227-F, 120-K, 556-K, 8-P
Stamping, 69-G, 79-G, 281-G, 456-G
Stampings, 111-G, 203-G, 255-G, 329-G, 479-G, 424-S
Stamping dies. See Dies, stamping
Standards. See Specifications
Statistical methods. See also Quality control, statistical
Statistical methods, 92-S
Steam, 322-R
Steam-generation equipment. See Boilers
Steam turbines. See Turbines, steam
Steels. See also Cast steels; Stainless steels; Steels, alloy; or Toolsteels
Steels,
aging of, 227-M, 83-N, 202-N, 216-N, 199-N, 318-N, 666-Q, 882-Q, 939-Q
for aircraft, 212-L, 68-T, 1082-Q
aluminum additions to, 1040-Q
aluminum bonding to, 665-L
aluminum-coated, 805-L, 412-R, 284-T
aluminum coating of, 307-L, 703-L

Steels (cont.)
aluminum coatings for, 210-K, 252-K, 85-L, 318-L, 386-L, 529-L, 773-L, 531-T
aluminum nitride precipitation in Al-killed, 7-P
aluminum welding to, 703-L
aluminum-zinc coatings for, 529-L
analysis of, 43-S, 127-S, 277-S, 440-S
analysis of gases in, 160-S, 163-S
analysis for nonmetallic inclusions in, 160-S
anelasticity of, 274-Q, 483-Q, 502-Q
annealing of, 223-E, 30-J, 58-J, 95-J, 209-J, 257-J, 279-J
application of, 363-D, 165-Q, 243-Q, 245-Q, 214-R, 459-S, 78-T, 133-T, 174-T, 451-T, 483-T, 509-T, 516-T, 35-V
arsenic influence on properties of, 464-M
austenite decomposition in, 106-N
austenite phases in, 24-M
austenite transformation in, 275-M, 3-N, 60-N, 67-N, 99-N, 204-N, 217-N, 223-N, 288-N, 576-P
for automobile parts, 252-R, 469-T
Bauschinger effect in, 432-P
bend strength of, 130-Q
bend testing of, 181-Q, 182-Q, 618-Q, 1044-Q
Bessemer, 240-D, 446-G, 19-M, 439-Q, 950-Q, 951-Q
basic, 186-D, 187-D, 555-Q, 921-Q
for boilers, 242-Q, 482-T
bonding with rubber, 235-K
brass-plated, 549-E, 252-R
brass welding to, 480-K, 486-K
brazing of, 3-K, 69-K, 566-K, 777-K, 804-K
brittle-ductile transition in, 3-Q
brittleness of, 13-Q, 151-Q, 291-Q, 339-Q, 789-Q, 833-Q
cadmium-coated, 805-L
cadmium-tin plated, 718-L
carbide reaction with, 64-Q, 485-Q, 696-Q
carbon content vs. work-hardening properties, 12-Q
carbon determination in, 270-S
carbon diffusion in, 227-N, 258-N
carbonitriding of, 121-J, 124-J
carburizing of, 88-J, 102-J, 213-J, 253-J, 264-J, 842-L, 873-Q, 68-S
casting of, 274-D, 325-D, 52-E, 502-E, 513-E, 576-E
casting properties of, 115-C
cathodic protection of, 57-R, 72-R, 73-R, 90-R, 105-R, 167-R, 411-R, 538-R

Steels (cont.)
cerium determination in, 80-S
for chemical equipment, 141-R, 271-T
chromium-plated, 549-E, 833-L
chromium plating of, 174-L, 349-L, 434-L
chromium-zinc coatings on, 930-L
chromized, 109-L, 161-V
chromizing of, 30-J, 11-L, 109-L, 219-L, 385-L, 782-L, 790-L, 811-L
cladding of, 38-L, 134-L, 376-L, 995-L, 212-T, 544-T
cleaning of, 185-L, 248-L, 388-L, 462-L, 624-L, 676-L
coatings for, 90-L, 253-L, 379-L, 808-L, 842-L, 969-L
ceramic, 130-L, 399-L, 102-L, 241-L, 502-L
chemical, 189-L, 666-L
corrosion-preventive, 228-L, 396-R, 408-R, 409-R
enamel, 162-L, 168-L, 239-L, 253-L, 268-L, 308-L
lacquer, 342-L
metallic, 697-L
nonmagnetic, 98-S
oil or grease, 464-L, 396-R
paint, 12-L, 14-L, 182-L, 248-L, 325-L, 337-L, 447-L, 644-L, 20-R, 252-R
phosphate, 230-L, 231-L
plastic, 351-L, 639-L, 853-L
spray, 674-L, 891-L
cold-rolled, 490-T
compositions of — book, 245-Q
compression testing of, 727-Q
conductivity, electrical, 210-P
conservation of, 188-Q
copper determination in, 113-B
copper-plated, 549-E, 198-J
copper plating of, 138-J
copper and tin in, 235-Q
copper welding to, 480-K
corrosion of, 227-M, 166-P, 66-R, 67-R, 69-R, 99-R, 157-R, 160-R, 246-R, 272-R, 316-R, 393-R, 26-T
corrosion
acid, 14-R, 36-R, 205-R, 361-R, 445-R
atmospheric, 288-R, 319-R, 384-R
biological, 108-R
chemical, 15-R, 37-R, 103-R, 289-R, 379-R, 516-R
crude-oil, 422-R
galvanic, 45-R, 92-R, 408-R, 409-R
intergranular, 453-R
marine, 388-R
salt, inorganic, 276-R
sulfur, 35-R, 206-R
underground, 72-R
water, 889-Q, 431-R, 445-R
by zinc alloys, molten, 930-Q

Steels (cont.)
corrosion cracking of, 496-R
corrosion fatigue of, 85-R
corrosion, incipient, 511-R
corrosion inhibition of, 529-R
corrosion inhibitors for, 48-R, 87-R, 106-R, 139-R, 172-R, 226-R, 282-R, 298-R, 485-R
corrosion prevention of, 688-L, 967-L, 47-R, 119-R, 520-R
corrosion-preventive coatings for, 91-R
corrosion rate, 505-R
corrosion resistance of, 109-L, 705-Q, 271-T
corrosion-resisting, 415-R, 66-T, 367-T
corrosion testing of, 131-R, 531-R
cracking of, 107-Q, 539-Q, 1082-Q
creep of, 297-Q, 386-Q, 592-Q, 604-Q, 705-Q, 758-Q, 898-Q
creep strength of, 432-Q, 870-Q
creep strength vs. microstructure, 72-Q
crystallization of, 64-N
cupping, hot, 451-G
Curie point — influence of sulfur on, 576-P
cutting of, 44-G, 128-G, 576-Q
cyaniding of, 16-J
decarburization of, 261-D, 213-J, 231-J, 260-J
de-enameling of, 13-L
deep-drawing, 122-D, 123-D, 71-S
defects in — book, 356-M
deformation from hardness-test indenters, 448-Q
degreasing of, 253-L, 462-L
density of, 44-P, 12-Q
deoxidation of, 123-D, 261-D, 324-D, 354-D
dephosphorization of, 261-D, 316-D
descaling, 123-L, 291-L
desulfurization of, 261-D, 278-D, 312-D, 342-D
detinning, 75-A
dielectric properties of, 295-P
diffusion in, 100-N, 102-N
by direct reduction of ore, 72-D, 87-D, 135-D, 211-D
drawing of, 363-D, 76-G, 111-G, 115-G, 192-G, 370-G, 451-G, 465-G, 480-G, 500-G, 939-Q
drawing compounds for, 117-G
drilling and reaming of, 125-G, 394-G
ductility of, 98-E, 101-Q, 209-Q, 225-Q, 833-Q
economic trends, 28-A, 175-A
effect of nitrogen on temper brittleness, 212-Q

Steels (cont.)
effect on oxidation of lubricating oils, 381-P
elastic properties of, 225-Q, 1084-Q
elasticity hysteresis of shafts, 773-Q
elasticity modulus of, 225-Q, 622-Q
electrical losses in, 200-P
electrodeposition on, 126-F, 275-L, 291-L, 342-L
electropolished, 865-L
electropolishing of, 354-L, 355-L, 716-L, 865-L
embrittlement of, 162-D, 204-Q, 447-Q, 539-Q, 827-Q, 999-Q
enameled, 52-L, 124-L, 480-L, 533-L, 436-T
enameling, porcelain, 81-L, 168-L, 239-L, 407-L, 533-L, 554-L, 729-L, 820-L
etchants, metallographic, 10-M, 356-M, 413-M
etching of, 149-L, 402-M
exothermic feeding compound for, 416-E
expansion, thermal, 367-M
extrusion of, 94-F, 103-F, 167-F, 283-F
extrusion
cold, 35-F, 261-G, 301-G, 362-G
hot, 332-F
fabrication of, 30-D, 456-T, 35-V
failures of, 1010-Q
fatigue-crack initiation in, 851-Q
fatigue strength of, 133-Q, 174-Q, 222-Q, 244-Q, 285-Q, 341-Q, 346-Q, 596-Q, 682-Q, 694-Q, 706-Q, 998-Q, 1068-Q, 469-T
fatigue strength of — aging effects, 882-Q
fatigue strength of — cold-working effects, 858-Q
fatigue strength of drill rods, 889-Q
fatigue strength of — size effect, 525-Q
fatigue strength of springs, 375-S
fatigue strength — surface finish effects, 594-Q
fatigue testing of, 236-Q, 299-Q, 415-Q, 491-Q, 603-Q, 688-Q, 1043-Q, 1071-Q, 1083-Q
finishing of, 229-L, 264-L, 632-L, 772-L, 842-L, 886-L, 145-T
flake formation in, 162-D
flame cutting of, 170-G, 189-G, 194-G, 202-G, 207-G, 228-G, 241-G, 242-G, 353-G
forging of, 32-F, 72-F, 74-F, 96-F, 121-F, 167-F, 192-F, 273-F, 283-F, 370-G, 465-G
formability of, 923-Q
forming of, 167-F, 283-F, 76-G, 14-K
forming lubricant for, 31-F
foundry practice, 339-E

Steels (cont.)
foundry risers, 209-E
fractures of, 3-Q, 421-Q, 474-Q, 699-Q, 833-Q, 1026-Q, 1027-Q, 1077-Q, 1086-Q
fracture testing of, 789-Q
free-cutting, 277-D, 490-T
free-machining, 71-S
frictional properties of, 72-Q, 429-Q, 1022-Q
galvanized, 415-R, 432-R
galvanizing of, 237-L, 315-L
gases in, 162-D
grain growth in, 223-E, 272-N
grain refining of, 278-Q
grain size of, 74-M, 473-M
graphitization of, 5-N, 179-N, 276-N, 86-Q
grinding of, 55-G, 188-G, 248-G, 439-T
hardenability of, 27-J, 63-J, 211-J, 469-T
hardenability testing of carburized, 237-J
hardened, 873-Q
hardening of, 30-J, 169-J, 183-J, 199-N, 569-Q
hardening,
  age, 113-N
  case, 16-J, 20-J, 49-J, 52-J, 92-J, 118-J, 168-J, 184-J, 216-J, 258-J
  flame, 14-J, 38-J, 99-J, 105-J
  induction, 59-J, 112-J, 167-J
  quench, 6-J, 43-J, 50-J, 54-J, 68-J, 69-J, 245-J
  stress, 934-Q
  surface, 138-J, 268-J
  work, 12-Q, 624-Q
hardness of, 486-G, 12-Q, 515-Q, 569-Q, 726-Q, 870-Q, 955-Q
hardness vs. microstructure, 182-M
hardness and strength of, 223-Q
hardness testing of, 804-K, 360-Q, 870-Q
heating of, 109-F, 30-J
heat ray protection by, 82-P
heat-resisting
  applications for, 214-R, 66-T, 149-T, 157-T, 502-T, 145-V
  corrosion fatigue of, 214-R
  creep resistance of, 220-Q
  creep strength of, 679-K, 944-Q
  embrittlement of, 671-Q
  expansion, thermal, 502-T
  failures, service, 54-T
  fracture strength of, 305-Q
  mechanical properties of, 956-Q, 54-T, 502-T
  microstructure of, 205-M, 944-Q
  notch effects on, 671-Q
  oxidation, high-temperature, 214-R

Steels (cont.)
heat-resisting (cont.)
  scaling of, 679-K
  specific gravity at high temperatures, 502-T
  strength properties of, 679-K
  Timken Roller Bearing Co. research, 956-Q
  welding of, 665-K, 679-K
heat treatment of, 354-D, 364-D, 98-F, 21-J, 50-J, 67-J, 115-J, 125-J, 183-J, 187-J, 201-J, 216-J, 217-J, 223-M, 31-Q, 585-Q, 939-Q, 459-S
  atmospheres for, 177-J
  electron-microscope study of, 227-M
  flame, 29-J
  in France, 439-T
  induction, 29-J
  residual-stress effects, 751-Q
heat treatment after carburizing, 264-J
heat treatment, production, 9-J
heat treatment, salt-bath, 216-J
high-carbon, 5-V
honing of, 159-L, 204-L
hydrogen in, 162-L, 168-L, 239-L, 308-L, 292-N
hydrogen diffusion in, 308-N
hydrogen effects on, 107-Q, 1082-Q
hydrogen introduction into, 1082-Q
impact strength of, 354-D, 98-E, 13-Q, 151-Q, 179-Q, 204-Q, 421-Q, 538-Q, 1060-Q
impact testing of, 419-Q, 619-Q, 996-Q, 1083-Q, 1090-Q
inclusions in, 109-D, 721-Q, 411-S
for investment castings, 18-E
joining of, 5-K, 142-K, 547-K, 804-K, 846-L, 864-L
lead-coated, 805-L, 412-R
low-temperature effects on, 66-J
lubrication of, 1031-Q
Lüder bands in, 378-Q
machinability of, 205-G, 284-G, 376-G, 460-G, 506-G
machining of, 243-G, 246-G, 505-G, 115-J, 112-T
  carbide, 219-G
  chip formation during, 244-G
  cutting fluids for, 258-G
  cutting forces and rates, 311-G
  cutting temperatures vs. tool wear, 403-G
  France, 439-T
  high-speed, 276-G
  plastic deformation during, 94-G, 470-G
  productivity data, 464-G
  standards for, 251-S
  surface-finish effects, 297-G
  tool life factors, 3-G

Steels (cont.)
macrostructure of, 324-D, 325-D
magnetic analysis of, 36-N, 129-N
magnetic properties of, 406-P, 417-P, 432-P
manganese determination, spectrographic, 447-S
manganese diffusion, superficial, 280-N
manganese distribution in, 296-D
martensite transformations in, 60-N, 62-N
mechanical properties of, 126-G, 158-J, 98-K, 489-K, 74-M, 245-Q, 903-Q, 547-R
melting of, 213-D, 510-E
metal spraying of, 205-L
metal transfer from copper during sliding contact, 34-Q
metal cutting temperatures in, 369-G
metallographic studies of, 717-K, 149-M
metallurgy of, 274-D, 717-K, 35-V
microscopy, electron, 125-M, 227-M, 423-M
microstructures of, 354-D, 364-D, 126-G, 209-G, 74-M, 273-M, 367-M, 12-Q
microstructure vs. creep strength and internal friction, 72-Q
microstructure vs. hardness, 182-M
milling of, 113-G, 381-G
in mining equipment, 72-T, 83-T
molten, 302-D, 344-D, 179-E, 329-P, 499-P, 69-S, 225-S, 290-S, 404-S, 405-S, 410-S, 452-S, 471-S
molybdenum diffusion, superficial, 278-N
molybdenum disulfide adherence to, 142-P
nickel-plated, 549-E
nickel plating of, 415-L, 624-L, 1058-Q
nickel determination in, 317-S
nitrided, 158-J
nitriding of, 158-J, 195-L, 145-T
nitrogen absorption by, 101-P
nitrogen determination in, 89-S, 383-S, 407-S
nondestructive testing of, 356-M, 255-S
notch sensitivity of, 833-Q
nucleation of, 179-N, 272-N, 276-N
openhearth, 113-B
oxidation, high-temperature, 445-R
oxide films on, 450-M
oxygen determination in, 36-D, 411-S, 534-S
packaging, corrosion-preventive, 317-R, 365-R
patternmaking for, 609-E
peening, shot, 429-G, 742-Q, 889-Q
phase diagrams for, 464-M

Steels (cont.)
phosphating of, 83-L, 248-L, 539-L, 574-L, 622-L, 710-L, 756-L, 408-R, 409-R
phosphorus determination in, 357-S
pickling of, 149-L, 269-L, 533-L, 700-L, 958-L, 970-L
pickling inhibitors for, 395-L, 527-L, 921-L
pitting of, 547-R
pitting inhibitors for, 407-R
plastic deformation of, 365-G, 470-G, 68-Q, 98-Q, 354-Q, 643-Q, 934-Q, 975-Q, 1086-Q
plastic properties of, 460-Q
plating of, 253-D
polishing of, 463-L, 716-L, 937-L. 121-M, 161-V
polishing vs. hardness, surface, 515-Q
porous, 64-D
powder cutting of, 66-G
press forming of, 29-G, 92-G
prestressing of, 123-G, 185-G
production statistics, 66-A, 143-A, 161-A, 162-A
properties of, 35-V
quenching media for — book, 22-J
for railroad equipment, 26-T, 305-T
recrystallization of, 82-N, 272-N
reinforced with aluminum, 104-T
research on, 181-A
residual-element effects, 130-Q
resistivity of, 367-P, 12-Q
rimmed, 185-V
rolling of, 363-D, 2-F, 97-F, 100-F, 101-F, 261-F, 309-F
rolling mills for, 53-F, 77-F
sawing, band, 126-G
scaling of, 130-Q, 109-R
segregation-study methods, 215-M
separation of carbides from, 358-S
shear of, 979-Q
shell molding of, 316-E, 405-E, 505-E
shelly spots in railroad rails, 258-Q, 259-Q
shock-wave propagation in, 117-Q
shrink fits of, 182-K
silicon determination, spectrographic, 447-S
silicon-oxygen equilibrium in, 91-P
silver-plated, 549-E
smoothness of burnished surfaces in, 156-L
soldering of, 170-K
solidification of, 274-D, 86-E, 576-E, 40-N, 91-N
sorting of, 356-M, 347-S
specifications for, 47-S, 129-S, 200-S, 313-S, 435-S, 460-S

Steels (cont.)
for springs, 375-S, 125-T, 276-T
spring, 223-J, 605-K, 851-L, 369-Q, 842-Q, 375-S, 113-V. See also Steels, alloy
stainless-clad, 54-T
standards — French, 460-S
standards — Italy, 531-S
standards and specifications of, 69-J
statistics for Europe, 365-A
statistical control of, 209-Q
strength properties of, 652-Q
strength for reinforcing purposes, 390-Q
strength-weight ratio for, 981-Q
stress analysis of, 232-Q, 722-Q, 771-Q
stress concentration, 252-Q
stress corrosion of, 68-R, 250-R, 326-R, 331-R, 358-R, 494-R, 517-R
stress measurements of, 1066-Q
stress relaxation in, 73-J
stress relief of, 19-J, 747-K
stresses, residual, 749-K, 751-Q, 857-Q
stress-strain properties of, 775-Q, 934-Q
structural,
aging of, 946-Q
bolting design for, 719-K
brittleness of, 1080-Q
in buildings, 476-S
cathodic protection of, 127-R, 460-R
coatings for, 604-L, 805-L, 21-R, 127-R
corrosion of, 21-R, 462-R, 491-R
corrosion prevention of, 113-R
Czechoslovakian, 159-S
descaling of, 21-R
design of, 506-T, 508-T
ductility of, 70-Q
effects of teeming speeds on ingot quality of, 308-D
factors in selecting, 142-T
failures, service, 54-T
fracture sensitivity of welded, 557-Q
fractures in, 418-Q, 457-S
hardening of, 505-Q, 946-Q
impact strength of, 505-Q
mechanical properties of, 940-Q, 54-T
mechanical testing of, 313-S
microstructure of, 259-M, 274-M
new developments, 501-T
notch sensitivity of, 505-Q
phosphating of, 577-L
pickling of, 577-L
plastic properties, 936-Q
production of, 350-G
riveting design for, 719-K
Russian, 159-S
specifications for, 366-S, 476-S
strength properties of — book, 401-Q
stresses in plate members, 416-Q

Steels (cont.)
structural (cont.)
structure, crystal, 259-M
supply situation, 129-A, 304-A
surface conditioning, 105-F, 604-L
tensile tests for, 340-Q
weldability of, 781-K, 940-Q
welding of, 35-K, 96-K, 115-K, 418-K, 421-K, 499-K, 598-K, 676-K, 677-K, 693-K, 694-K, 707-K, 711-K
welding design for, 719-K
yield point of, 1041-Q
structures, crystal, 51-M
structures, deformation, 226-Q, 518-Q, 939-Q
sulfur determination in, 89-S
sulfur diffusion in, 227-N
supply situation, 176-A
surface treatment with cerium of, 106-M
surfacing, hard, 289-L
swaging of, 304-F
temper brittleness of, 135-Q, 1032-Q
tempering of, 43-J, 236-J, 265-J, 35-N, 36-N, 129-N
tensile strength of, 242-F, 804-K, 13-Q, 58-Q, 143-Q, 151-Q, 225-Q, 369-Q, 421-Q, 758-Q, 870-Q, 934-Q, 1004-Q
tensile-stress curves of, 661-Q
tensile testing of, 727-Q, 1004-Q
testing of, 274-D
thermodynamics of iron-carbon system in, 109-P
thermomagnetic properties of, 12-Q
tin-cadmium plated, 718-L
tin coating of, 637-L, 709-L, 805-L, 412-R
tin-copper plating of, 93-L
tin-nickel plating of, 93-L
tin plating of, 451-Q
tin-zinc plating of, 93-L
titanium determination, 463-S
tool. See Toolsteels
torsion strength of, 469-T
torsion testing of, 391-Q, 727-Q, 773-Q
transformations in, 78-A, 126-G, 236-J, 4-N, 35-N, 187-N, 585-Q
transition temperatures of, 31-Q, 225-Q, 833-Q
tungsten diffusion, superficial, 407-M
twinning of, 1026-Q
upsetting of, 322-F
vanadium impregnation, superficial, 747-L
vibration damping of, 596-Q
wear resistance of, 281-Q, 289-Q, 730-Q, 973-Q, 272-R
wear against soils, 370-Q
weld-brazing of, 174-K

Steels (cont.)
weld-deposited coatings, 140-K, 752-L
weldability of, 189-K, 191-K, 634-K, 767-K, 109-L, 302-Q
welding of, 14-K, 201-K, 204-K, 224-K, 238-K, 242-K, 287-K, 308-K, 500-K, 591-K, 653-K, 676-K, 712-K, 804-K, 585-Q
welding,
aluminothermic, 631-K
arc, 57-K, 112-K, 113-K, 118-K, 158-K, 192-K, 193-K, 230-K, 269-K, 425-K, 429-K, 531-K, 645-K, 673-K
argon-oxygen-shielded arc, 172-K
atomic hydrogen, 299-K, 423-K
butt, 299-K, 372-K, 423-K
design for, 218-K
electrodes for, 50-T
flash, 104-K, 432-K, 564-K
fluxes for, 266-K
gas, 55-K
gas-shielded-arc, 101-K, 446-K, 662-K, 646-K, 657-K
metallurgy of, 717-K
in mine maintenance, 288-K
projection, 214-K, 245-K
resistance, 196-K, 264-K, 299-K, 388-K, 423-K, 540-K
slag adherence in, 267-K
spot, 19-K, 149-K, 361-K, 371-K, 447-K, 491-K
stresses, residual, 489-K
submerged-arc, 58-K, 72-K, 75-K, 239-K, 514-K, 541-L
welding to aluminum, 690-K
working of, 98-F, 12-Q
x-ray studies of, 149-M
yield point in bending of, 1066-Q
zinc-aluminum coatings for, 529-L
zinc-coated, 805-L, 412-R
zinc coatings for, 567-L, 531-T
Steels, alloy. See also Stainless steels; or Toolsteels
Steels, alloy
aging of, 91-J, 177-Q
for aircraft, 906-Q, 68-T
aluminum, 208-P, 940-Q, 237-S
aluminum-chromium-copper-nickel, 904-Q
aluminum-chromium-manganese-molybdenum-silicon-vanadium, 40-J
analysis of, 165-S, 440-S
annealing of, 91-J, 93-J, 228-J, 257-J
applications for, 356-K, 477-Q, 141-R, 164-R, 38-T, 81-T, 174-T, 303-T, 452-T, 502-T
austempering, 91-J, 108-J
austenite decomposition in, 71-N
Steels, alloy (cont.)
in automobile parts, 243-J, 150-T
for boilers, 242-Q, 482-T
boron, 157-V
boron,
applications of, 51-J, 170-J, 941-Q, 111-T, 17-V, 36-V, 49-V, 56-V, 130-V, 157-V, 169-V
brittleness of, 698-Q
compositions of, 56-V, 59-V, 103-V, 104-V, 135-V
in design, 194-V
determination of boron in, 504-S
fabrication of, 157-V
fatigue strength of, 698-Q, 760-Q, 56-V
forgeability of, 188-J
forging of, 157-V
hardenability of, 317-D, 51-J, 109-J, 110-J, 160-J, 170-J, 188-J, 194-J, 237-J, 238-J, 941-Q, 546-T, 29-V, 56-V
hardness of, 160-J
heat treatment of, 3-J, 160-J, 220-J, 760-Q, 157-V
impact strength of, 698-Q
machinability of, 160-J, 188-J
machining of, 220-J
mechanical properties of, 51-J, 331-Q, 941-Q, 29-V, 59-V, 103-V, 104-V, 135-V
microstructure of, 51-J, 160-J, 157-V
production of, 317-D, 157-V, 169-V
properties of, 382-Q, 49-V, 157-V
rolling of, 157-V
in shafts, 56-V
specifications for, 328-S
as substitute for scarce alloys, 62-A
tensile strength of, 147-Q, 974-Q, 56-V
transformations of, 220-J, 56-V
wear resistance, 56-V
weldability of, 331-Q
yield strength of, 147-Q
boron-chromium-molybdenum-titanium, 532-T
boron-molybdenum, 147-Q
brazing, furnace, 566-K
brazing, silver, 76-K
brittleness of, 833-Q
carbides in, 68-N
carbide tools fabricated from, 108-T
carburizing, 70-J, 155-J, 253-J
casting of, 19-E, 247-E
chromium,
annealing of, 64-J, 172-J, 463-Q
for bearings, 491-T
creep resistance of, 1008-Q
hardenability of, 243-J, 941-Q

Steels, alloy (cont.)
chromium (cont.)
hardening of, 94-J
machining forces and rates, 311-G
mechanical properties of, 463-Q, 941-Q
microstruction of, 350-M
melting of, 296-D
patenting vs. mechanical properties of wires, 463-Q
physical properties of, 208-P
scarfing, torch, 227-G
torsion testing of, 391-Q
transformations, isothermal, 157-N, 158-N
wear against soils, 370-Q
welding — gas shielded-arc, 228-K, 554-K
chromium-cobalt-tungsten, 192-P
chromium-cobalt-tungsten-vanadium, 64-J, 172-J
chromium-copper, 26-T
chromium-copper-manganese, 293-Q
chromium-copper-molybdenum-nickel-silicon, 15-R
chromium-copper-nickel, 543-Q, 904-Q, 15-R
chromium distribution in, 296-D
chromium-manganese, 293-Q, 820-Q, 305-T
chromium-manganese-molybdenum-nickel, 196-V
chromium-manganese-silicon, 492-Q
chromium-molybdenum, 274-M
in aircraft parts, 761-K
corrosion — organic chemicals, 187-R
creep of, 361-Q
creep strength of — microstructure effects, 112-Q
creep testing of, 1088-Q
decarburization of, 1092-Q
fatigue strength of, 1092-Q
fatigue testing of, 1088-Q
forging of, 118-F
hardening, induction, 208-J
heat treatment of, 118-F, 181-J
high-temperature properties of, 181-J
mechanical properties of, 773-K
microstructure of, 336-Q
microstructure vs. creep resistance, 112-Q
TTT-diagrams for, 773-K
ultrasonic attenuation in, 213-P
welding of, 118-F, 181-J, 681-K, 743-K, 773-K
chromium-molybdenum-nickel, 20-D, 63-F, 133-F, 65-J, 130-K, 489-K, 761-K, 889-Q, 309-S

Steels, alloy (cont.)
chromium-molybdenum-vanadium, 265-Q, 673-Q, 677-Q, 705-Q, 817-Q
chromium-nickel. See also Stainless steels
chromium-nickel, 65-J, 171-M, 232-M, 97-Q, 525-Q, 1049-Q, 1056-Q, 143-R, 313-S, 112-T, 127-V
chromium-plated, 586-Q
chromium-silicon, 114-J
chromium-vanadium, 64-J, 172-J, 243-J, 200-V
coatings for, 502-L, 842-L, 909-L
conservation of, 295-A, 355-A
copper, 915-Q, 320-R, 26-T
copper-manganese, 1039-Q, 26-T
copper-manganese-molybdenum, 659-K
copper-manganese-nickel, 1039-Q
copper-molybdenum-nickel, 940-Q
copper-nickel, 541-Q, 1039-Q
copper-nickel-tin, 541-Q
copper-silicon, 6-R
copper-tin, 541-Q
corrosion of, 1072-Q, 45-R, 69-R, 92-R, 99-R, 160-R, 323-R, 386-R
corrosion cracking of, 496-R
corrosion protection of, 137-R
corrosion resistance of, 195-V
corrosion testing of, 131-R, 448-R
creep of, 171-Q, 177-Q, 334-Q, 757-Q
creep strength of, 870-Q, 924-Q, 944-Q
cyaniding of, 70-J
decarburization of, 375-S
density of, 12-H, 99-P, 12-Q
diffusion of arsenic in, 88-N
diffusion of phosphorus in, 88-N
ductility of, 67-Q, 201-Q, 375-Q, 528-Q, 833-Q
elasticity hysteresis of shafts, 773-Q
electric furnaces for production of, 272-D
electropolishing of, 354-L
embrittlement of, 204-Q, 999-Q, 495-R
emissivity, spectral, 173-P
fatigue strength of, 290-Q, 341-Q, 594-Q, 597-Q, 680-Q, 682-Q, 694-Q, 706-Q, 874-Q, 375-S, 469-T
fatigue testing of, 491-Q, 766-R, 1043-Q
finishing of, 842-L
flame cutting of, 184-G
forging of, 181-F, 916-Q, 53-T
for forging-hammer shafts, 304-T
fractography of, 295-M
fracture of, 833-Q, 1072-Q
fracture strength of, 924-Q
in furnace construction, 224-T

Steels, alloy (cont.)
graphitization of, 50-N, 170-N, 86-Q, 592-Q, 924-Q
grinding, abrasive, 212-G
hardenability of, 27-J, 211-J, 243-J, 121-N, 815-Q, 916-Q, 469-T
hardening of, 217-G, 42-J, 44-J, 49-J, 53-J, 70-J, 99-J, 226-J, 569-Q
hardening furnaces for, 169-J
hardness of, 12-Q, 409-Q, 513-Q, 569-Q, 870-Q, 877-Q, 1049-Q
hardness testing of, 870-Q
heat treatment of, 219-D, 18-J, 35-J, 56-J, 90-J, 106-J, 120-J, 217-J, 228-J, 375-S, 53-T
for high temperatures, 248-Q
hydrogen determination in, 319-F
hydrogen effects, 67-Q, 375-Q, 528-Q
impact strength of, 204-Q, 207-Q, 408-Q, 513-Q, 874-Q, 876-Q, 877-Q
impact testing of, 619-Q, 1090-Q
inclusions in, 165-D, 300-D, 152-Q, 392-Q
investment casting of, 77-E, 203-E, 221-E
for low temperatures, 906-Q
low temperature effects on, 66-J
machinability of, 78-G, 460-G, 506-G
machining of, 3-G, 158-G, 217-G, 403-G, 470-G, 505-G, 514-G
magnetic properties of, 406-P
manganese,
application of, 85-F, 41-T, 421-T, 127-V, 159-V
bend and vibratory stress of, 283-Q
brittleness factors, 13-Q, 151-Q
corrosion fatigue of, 820-Q
exothermic feeding compound for, 416-E
fabrication of, 129-Q
fatigue strength of, 820-Q
flame hardening of, 624-Q
forgeability of, 343-D
French practice, 221-B
hardenability of, 243-J, 941-Q
heat treatment, 624-Q, 159-V
impact strength of, 13-Q, 151-Q
martensite transformation in, 104-N, 105-N
mechanical properties — boron effects, 941-Q
nitriding, 624-Q
piercing of, 513-G
plastic deformation of, 129-Q
properties of, 221-B, 159-V
tensile strength of, 13-Q, 129-Q, 151-Q, 1039-Q
titanium and zirconium as substitute materials, 271-Q
transformations in, 751-K

Steels, alloy (cont.)
manganese (cont.)
welding, arc, 378-K, 240-L
yield strength of, 1039-Q
manganese-molybdenum, 534-K, 680-K, 129-Q, 477-Q, 1081-Q
manganese-nickel, 130-K, 127-V, 159-V
manganese-silicon, 196-V
mechanical properties of, 12-H, 122-K, 89-Q, 342-Q, 815-Q, 903-Q, 956-Q, 195-V
metallography of, 221-M
microstructure of, 209-G, 259-M, 12-Q, 916-Q, 944-Q
molds for centrifugal castings, 447-E
molybdenum, 212-J, 243-J, 228-K, 554-K, 137-M, 941-Q, 1008-Q, 230-S, 60-V
molybdenum-nickel, 212-N, 606-Q, 607-Q
molybdenum-nickel-vanadium, 82-K, 1081-Q
molybdenum-vanadium, 361-Q
mosaic block sizes of, 84-M
nickel,
austenite, retained, 191-N
corrosion of, 519-R
density of sintered, 30-P
ductility of, 30-P
graphitization of, 191-N
hardenability of — boron effects, 941-Q
hardness of sintered, 30-P
heat treatment of, 164-N
mechanical properties of, 164-N, 941-Q
microstructure of, 30-P
quenching of, 191-N
quench testing of, 28-J
recrystallization of, 519-R
by reduction of ore, 72-D, 87-D, 135-D 211-D
stress corrosion, 124-R
tensile strength of, 30-P
toughness of, 607-Q
transformations in, 81-N, 104-N, 164-N
weldability of, 730-K
nickel-silicon, 235-J
nitrogen determination in, 264-S, 383-S
normalizing of, 146-J
notch sensitivity of, 833-Q
peening of — effect on fatigue life, 521-G
phosphating of, 375-S
plastic deformation of, 470-G, 201-Q
plating of, 375-S
production of, 102-C, 219-D. See also Steelmaking; Openhearth process; Blast-furnace process; Electric steelmaking; etc

Steels, alloy (cont.)
properties of, 143-T
quenching, 91-J
rare earths in, 190-B, 115-V
resistivity of, 12-Q
rolling of, 49-F, 311-F
shell molding of, 542-E
silicon, 223-J, 86-M, 504-P, 480-Q, 6-R
specifications for, 200-S, 313-S, 507-S
Czechoslovakian, 159-S
Russian, 159-S
for springs, 842-Q, 375-S, 125-T
stresses, residual, 873-Q
stress corrosion of, 494-R, 495-R
stress relief, thermal, 91-J
structural, 129-Q
structure, crystal, 259-M
substitutes for, 306-A, 243-D
temper brittleness of, 62-Q, 134-Q, 136-Q, 790-Q, 874-Q, 1079-Q
tempering, 91-J, 876-Q
tensile strength of, 58-Q, 870-Q, 874-Q, 924-Q, 1004-Q
tensile testing of, 1004-Q
thermal shock tests on, 246-Q
thermomagnetic properties of, 12-Q
tin coating of, 214-L
titanium, 229-D, 12-V
torsion strength of, 290-Q, 773-Q, 469-T
toughness of, 608-Q
transformations of, 146-J, 137-K, 68-N, 97-N, 99-N, 121-N, 469-T
transition temperatures of, 833-Q, 876-Q
tungsten, 64-J, 172-J, 212-J, 1008-Q, 82-V
for turbines, 53-T, 80-T, 148-T, 149-T
vanadium, 1008-Q, 149-V
weld deposits of stainless steel on, 140-K
weldability of, 122-K, 580-K, 766-K
for welded structures, 649-Q
welding of, 159-K, 265-K, 288-K, 308-K, 448-K, 776-K
welding
arc, 137-K, 246-K, 490-K, 517-K, 531-K, 647-K
flash, 78-K, 186-K
gas, 647-K
gas-shielded-arc, 657-K
resistance, 13-K
spot, 168-K
working, cold, 12-Q
zirconium, 229-D
Steel-aluminum composites, 703-L
Steel bars,
descaling of, 127-L
drawing of — speed control in, 235-F
forging of cups from, 465-G
hardening, flame, 280-J
Steel bars (cont.)
hardness of, 150-F
heat-treatment furnace for, 128-J
heating of, 291-F
impact strength of, 150-F
inspection of, 490-T
microstructure of, 150-F
nondestructive testing of, 538-S
pickling of, 69-L
rolling of, 367-B, 332-D
rolling mills for, 203-F
stresses in concrete reinforcement, 7-Q
tempering of, 280-J
tensile strength of, 150-F
Steel beams,
bend strength of H columns, 778-Q
design of welded, 521-K
failure analysis, 8-Q
fatigue strength of — welding effects, 464-K
fatigue testing of, 556-Q
inelastic strains in, 308-Q
load-deformation diagrams of, 651-Q
plastic properties of, 697-Q
straightening of, 150-F
strength testing of, 913-Q
stress analysis, photoelastic, 925-Q
stresses, residual, 420-Q
vibration properties of, 961-Q
welded reinforcement for, 416-Q
welding of, 520-K, 787-K
yield strength of, 420-Q
Steel bearings, 34-P, 96-Q, 97-Q
Steel billets, 134-F, 157-F, 451-G
Steels, case-hardened. See Steels, hardened
Steel castings. See also Cast steel; or Cast-steel foundry practice
Steel castings,
for agricultural uses, 559-T
brazing, repair, 454-K
design of, 375-E, 472-E, 493-E, 555-E, 590-E
flame cutting of, 454-K
gates and heads for, 173-E, 647-E
gating systems for, 526-E, 528-E
grain orientation in, 111-M
hardening, case, 20-J
heat treatment of, 402-E, 493-E, 543-E
hot tears in, 589-E
impact testing of, 359-Q
impregnation of, 206-E
inspection of, 493-E
investment, 103-E, 288-E, 772-Q, 878-Q
mechanical properties of, 54-Q, 89-Q
melting of, 294-D
nondestructive testing of, 220-Q, 402-S

Steel castings (cont.)
powder cutting for defect removal, 34-G, 64-G
production of, 37-E, 598-E, 636-E
properties of, 183-V
radiography of, 28-S, 95-S, 241-S
sand casting of large parts, 40-E
specifications for, 313-S, 374-S, 388-S, 420-S, 491-S, 183-V
surface-quality factors, 117-D, 118-D, 119-D, 120-D
vermiculite for, 174-E
welding of, 289-K, 291-K, 345-K, 360-K, 410-K, 453-K, 691-K
Steel coatings, 603-L
Steel containers, 330-A, 40-K, 248-K, 63-T
Steel forgings,
fatigue strength of, 679-Q, 683-Q
forming of, 245-F
for machine parts, 160-T, 214-T
mechanical properties of, 59-Q, 916-Q
mechanical testing of, 218-F
nondestructive testing of, 916-Q, 352-S
production of, 238-F, 265-F, 268-F, 297-F, 302-F
segregation in, 73-N, 172-N
specifications for reduction gears, 313-S, 420-S, 460-S
tensile strength of, 878-Q
tools for trimming of, 420-T
for turbines, steam, 218-F
Steel Founders Society of America, 195-E
Steel foundries,
directory — North America, 127-E
Steel industry,
Canada, 198-A
control equipment for, 399-S, 400-S, 401-S
developments during 1951, 59-A
economic trends, 8-A, 99-A, 226-A, 341-A 26-B, 356-D
electrical laboratory for, 370-S
electronics in, 78-S
of France, 251-A
fuels for, 83-A
gaging in, 422-S
in Great Britain, 68-A, 203-A, 299-A
India, 101-A, 118-A
instrumentation and control in, 56-S
nondestructive testing in, 422-S
punched-card analysis of data, 247-S
pyrometry in, 156-S
quality control in, 133-S, 144-S
resources — Australia, 272-A
review for 1951, 369-A
of Russian satellites, 292-B
South Africa, 275-A, 173-D
of South Wales — book, 91-A
Steel industry (cont.)
in Spain, 84-B
statistics, 327-A
Sweden, 77-B, 162-B, 248-D
temperature measurement in, 422-S
waste disposal in, 135-A, 340-A
Western U.S., 14-A
world, 209-A, 320-A
Steel ingots,
casting of, 51-D, 52-D, 54-D
casting, bottom, 39-D, 156-D
corrosion, gaseous, 452-R
defects in, 60-D, 304-D, 217-F, 356-M
feeder heads, insulated, 102-E
forging of, 217-F
hot topping of, 222-D
inclusions in, 8-D, 950-D
macrostructure of, 5-D
macrostructure control of, 1-D
manganese-composition deviations, 115-D, 116-D
microstructure of, 19-M
molds for — bibliography, 169-D
oxygen in production of, 97-D
piercing of, 270-F, 435-G, 477-G
production of, 121-D, 167-D, 264-D
scaling of, 452-R
segregation in, 193-D, 254-D, 73-N, 172-N, 950-Q
soaking-pit practice, 322-D
solidification of, 1-D, 162-D, 193-D, 116-N
specific gravity of, 950-Q
stress-strain properties of, 758-Q
structure of, 291-D, 318-D
Steel mills. See Steel plants
Steel pipes. See also Steel tubing
Steel pipes,
bending, hot, 387-G
blasting, sand, 799-L
cathodic protection of, 63-R, 102-R, 204-R
coatings for, 799-L, 943-L, 204-R, 257-R
corrosion, soil, 204-R
enameling, porcelain, 819-L, 978-L
fabrication of, 163-F, 277-F, 326-T
fatigue strength of, 650-Q
flame cutting of, 18-G, 295-G
forming and fabrication of, 277-F
fracture testing of, 776-Q
galvanized, 50-R
heat treatment of, 127-Q, 326-T
for high pressures and temperatures, 187-Q, 326-T
inspection of welds in, 219-S
manufacture of, 18-G
mechanical properties of, 127-Q
nickel-plated, 198-R, 209-R, 476-R
nondestructive testing, 127-Q, 150-S, 296-S, 326-T

Steel pipes (cont.)
plastic patching, 583-K
pressure testing of, 776-Q, 52-S
production of large diameter, 293-F
specifications for, 126-Q, 167-Q, 366-S, 420-S
strength of, 691-Q
thickness determination, x-ray, 394-S
welding of, 277-F, 293-F, 226-K, 279-K, 367-K, 450-K, 615-K, 625-K, 681-K, 689-K, 127-Q, 132-T, 326-T
Steel pipes, alloy, 167-Q, 309-S, 132-T
Steel plants,
ceramic materials in, 124-B
coal utilization in, 191-D
drive equipment in, 90-F
electrical equipment in, 87-F
equipment failures in, 496-S
Fairless Works, 309-A, 367-D
flame cutting in, 131-G, 132-G
Italy, 179-A
Jones & Laughlin Steel Corp., 3-D, 15-D
Lone Star Steel Co., 148-A
mill scale recovery in, 4-A
refractories for, 245-D, 271-D, 227-B
South African Iron & Steel Industrial Corp., 251-F
stainless steels in, 3-T
Steel Co. of Wales, 268-D
triplex process in, 80-D
waste recovery in, 3-A, 137-A
welding maintenance in, 2-K, 549-K
Steel plates. See also Steel sheets
Steel plates,
bending and twisting of, 432-G, 392-G, 521-Q
buckling of, 30-Q
cleaning, solvent, 80-L
coatings for, 560-L
crack test for, 536-K
cracking of, 536-K, 504-Q
enameling, porcelain, 560-L
fatigue strength of, 188-K
fatigue testing of, 504-Q
ferrite grain size for, 113-M
flame cutting of, 424-G
forming of, 245-F, 270-F, 435-G, 477-G
fractures in, 247-K, 418-Q, 910-Q
heat treatment of, 126-J, 174-J, 698-K
impact strength of, 910-Q
mechanical properties of, 1015-Q
microstructure of, 19-M
nondestructive testing, 234-S, 458-S
pickling, continuous, 583-L
piercing of, 513-G, 392-G
for pipelines, high-pressure, 127-Q
production of, 114-F
rolling of, 104-F, 130-Q
Steel plates (cont.)
specifications for, 313-S
stainless-clad, 698-K
stress analysis, 504-Q
stress relief, thermal, 174-J
testing of — explosion method, 247-K
thickness measurement, magnetic, 45-S
welding of, 114-K, 311-K, 317-K, 346-K, 458-K, 470-K, 698-K
welding electrodes for, 82-K, 501-K, 604-K
working, hot, 130-Q
Steel powders, 109-H, 115-H, 129-H, 481-K, 250-P
Steel powder products, 12-H, 115-H, 83-Q, 356-Q, 915-Q
Steel rods, 257-F, 259-F, 307-F, 206-J, 116-K, 117-K, 369-K, 53-T
Steel-rubber bonding, 586-K
Steel scrap, 67-A, 208-A, 332-A, 103-B, 113-B, 313-E, 253-S
Steel sheets. See also Steel plates; Steel strip; Sheet steel
Steel sheets,
aging, strain,
hardness and tensile-strength effects, 872-Q
aluminum-coated, 273-R, 318-R, 327-R, 329-R, 438-R
aluminum-killed, 141-N
annealing of, 154-F, 161-F, 165-F
bend strength of, 813-Q
brazing, silver, 300-K
cadmium-plated, 366-K
carburizing of, 462-G
cladding of, 840-L
cleaning of, 154-F, 161-F, 165-F, 257-L
coatings for, 268-L, 642-L
conservation of, 12-G
copper-clad, 840-L
core materials of, 87-T
corrosion of, 337-R
degreasing, 642-L
drawing, deep, 142-G, 950-Q
drawability determination of, 813-Q
electroplating of, 234-F
enameling, porcelain, 689-L, 741-L, 854-L
expanded-metal, 230-T
fatigue strength of, 526-Q
finishing of, 255-L, 261-L
forming of, 134-G, 469-G
galvanized, 273-R, 318-R, 327-R, 329-R, 380-R, 438-R
galvanizing of, 745-L
hardening, age, 872-Q
heat treatment of, 85-J
hysteresis-loop area determination, 337-P

Steel sheets (cont.)
machining of, 234-F
nickel applied to, 304-L
nickel-clad, 840-L
nickel coating, 859-L
pickling of, 17-F, 154-F, 161-F, 165-F, 234-F, 786-F
primers for, 988-L
punching, hot, 226-G
rolling of, 154-F, 161-F, 165-F, 250-F, 274-F
rolling, cold, 17-F, 110-F, 234-F
shearing of, 154-F, 161-F, 165-F
silver-clad, 840-L
slitting of, 462-G
specifications for, 248-F, 309-S
surface preparation for enameling, 786-L
tempering of, 17-F
tin coating of, 154-F, 161-F, 165-F, 57-L, 191-L
tin plating, 568-L
toy fabrication and finishing from, 61-G
weldability of — book, 180-K
welding of, 274-K, 300-K, 354-K, 374-K, 431-K
zinc electrodeposition on, 648-L
zinc-plated, 366-K
Steels, stainless. See Stainless steels
Steel stampings, 139-L, 989-L
Steel strip. See also Steel sheets
Steel strip, 141-F, 222-F, 247-F, 85-J, 153-J, 161-J, 206-J, 230-J, 286-L, 483-L, 583-L, 648-L, 950-Q, 503-S, 49-T
Steel tanks. See Pressure vessels
Steel tubing. See also Steel pipes
Steel tubing,
aluminum-coated, 387-R
annealing of, 156-F
bend strength of welded, 468-Q
coating, metallic, 963-L
corrosion, gaseous, 452-R
electrodeposition on, 27-L, 963-L, 992-L
fabrication of, 256-F
forming of, 156-F, 182-F
galvanizing, hot-dip, 745-L
for high temperatures, 956-Q
manufacture of — continuous, 14-F
reinforced, 242-F
scaling of, 452-R
seamless, 27-F, 92-F, 116-F, 223-F
specifications for, 309-S
strain development in, 76-F
welded, 183-J, 482-K
welding of, 156-F, 182-F, 327-K, 380-K, 130-Q
acetylene-oxygen, 513-K, 619-K
arc, 14-F, 270-K
Steel tubing (cont.)
welding (cont.)
butt, 403-K, 474-K
gas, 377-K, 482-K
gas-shielded-arc, 17-K
resistance, 243-F, 244-F
working, hot, 130-Q
zinc spraying through, 154-L
Steel welds,
arc, 247-J, 357-K, 378-K, 410-K, 680-K, 681-K
bend testing of, 106-K
brass, 480-K
copper, 480-K
cracks in— prevention of, 418-K
crack sensitivity of, 634-K, 653-K
ductility testing in plates, 106-K
fatigue strength of, 107-K, 419-K, 610-K, 142-Q
fatigue testing of, 492-Q
fracture sensitivity of, 557-Q
fractures in, 418-Q, 910-Q, 457-S
gas, 482-K
hardening, age, 505-Q
heat treatment of, 55-K, 58-K, 360-K, 633-K
impact strength of, 107-K, 419-K, 610-K, 505-Q
inspection in pipes, 219-S
iron-powder backup for, 413-K, 697-K
low-carbon — stainless, 467-K
mechanical properties of, 58-K, 493-K, 604-K, 654-K, 754-Q, 792-Q, 940-Q, 241-T
mechanical testing of, 441-K, 634-K
microcracks in, 107-K, 419-K, 610-K
microstructure of, 58-K, 381-K
nondestructive testing of, 58-K, 528-K, 65-S, 261-S, 458-S
normalizing of, 140-J
notch sensitivity of, 505-Q
porosity factors, 668-K
spot, 605-K
stress relief of, 140-J, 462-K, 683-K, 142-Q
stresses in, 429-K, 490-K, 529-K
submerged-arc, 625-K
tensile strength of, 107-K, 419-K, 610-K
testing of, 524-K
Steel wires,
aging vs. relaxation properties, 140-Q
bonderizing of —before drawing, 732-L
brass-plated, 297-T
coatings for, 609-L
for concrete, prestressed, 481-T
copper-plated, 297-T
creep of, 713-Q, 1030-Q
creep strength of, 102-Q

Steel wires (cont.)
descaling, mechanical, 68-L, 411-L
drawing of, 22-F, 25-F, 140-F, 175-F, 239-F, 255-F, 320-F, 732-L, 844-L
ductility of, 950-Q, 1029-Q
galvanized, 173-F, 317-F, 380-R
galvanizing of, 255-F, 745-L
hardening of, 185-J, 298-Q
heat treatment of, 175-J, 266-J
mechanical properties of, 108-F
for mining industry, 211-T
nickel plating of, 297-T
patenting of, 273-J
pickling of, 255-F
product fabrication from, 239-T
production of, 117-F, 255-F
stress-strain properties of, 367-Q
tin coating, hot-dip, 24-L
torsion testing of, 383-Q
welding of, 208-K, 647-K
for welding mild steel, 50-T
Steelmaking, 51-B, 75-D, 167-D, 363-D, 364-D, 380-D
Austrian converter process, 237-D
automatic process controls in, 203-S
basic, 37-D
book, 30-D, 171-D, 274-D
in Britain, 457-E
calcium cyanamide as ladle addition, 43-D
chemistry of, 21-D, 137-D
controlled density, 13-D
duplex process, 303-E
economic comparison of processes, 143-D
economic trends, 358-D
electric furnaces for, 180-D, 182-D
in Finland, 51-C
fluid flow in, 79-D
France, 439-T
in graphite-bar furnace, 261-D
improved processes in, 382-D
instrumentation and control in, 452-S
low-carbon — book, 333-D
from low-grade ores, 233-D
low nitrogen types, 391-D
low-shaft process, 236-D
for low-temperature service, 354-D
luminous flames in, 355-D
maintenance of ingot casting equipment, 127-D
manganese effects, 343-D
manganese substitutes in, 229-D
oxygen in, 185-B, 206-B, 86-D, 181-D, 198-D, 237-D, 239-D, 296-D, 299-D, 358-D, 359-D, 360-D
punched-card analysis of data, 247-S
quality control in, 330-D, 71-S, 101-S, 430-S
Steelmaking (cont.)
radioactive tracers in, 190-S
raw materials for, 51-B, 366-B, 235-D
by reduction, direct, 13-D
refractories for, 112-B, 328-B, 34-D 35-D, 217-D. See also Openhearth furnaces, refractories for
regulating systems for, 520-S, 535-S
research in, 321-D
slags, 12-A, 9-B, 263-B, 316-D, 30-S,
spiegeleisen in, 323-A
statistical methods in, 92-S
substitution for strategic metals in, 149-A
sulfur distribution and elimination in, 17-D
surface-defect formation factors, 253-D
surface-quality factors, 117-D, 118-D, 119-D, 120-D
temperature measurement in, 69-S, 452-S
theory of, 160-D, 219-D
thermodynamic properties of silicon monoxide, 543-P
thermodynamics of sulfur and sulfur compounds, 431-P
titanium as manganese substitute in, 229-D
trends in, 374-D
triplex process, 238-D
U.S. Steel Co., Ohio Works, 121-D
zirconium as manganese substitute in, 229-D
Steelmaking furnaces. See also Openhearth furnaces; Blast furnaces; etc.
Steelmaking furnaces, 285-B, 215-D, 267-D, 272-D, 400-D
Steelmaking ladles, 19-D, 33-D, 49-D, 113-D, 384-E
Stellites. See Cobalt alloys; or Heat-resisting alloys
Stiffness. See Plastic properties
Stitching. See also Fastening
Stitching, 341-K, 414-K
Stoves, 116-A, 204-G, 559-L, 284-T
Straightening, 323-F, 59-G, 388-G
Strains. See Stresses
Strain gages, 206-Q, 219-Q, 264-Q, 388-Q, 734-Q, 737-Q, 1058-Q, 543-S
applications of, 22-Q, 23-Q, 175-Q, 343-Q, 715-Q, 716-Q
book, 957-Q
coatings, ceramic, 934-L
for high temperatures, 20-Q, 21-Q
testing of, 18-Q, 19-Q
wire type — in machine design, 26-Q
Strain-gage analysis. See Stress analysis, strain-gage.

Strategic metals. See Metals, strategic
Strength properties, 352-Q, 353-Q, 355-Q, 400-Q
book, 404-Q
of materials — book, 84-Q
of metals, 315-M, 536-Q, 779-Q, 841-Q
Stresses. See also Stress analysis
Stresses, 288-Q, 1011-Q
alternating. See Fatigue testing
internal, 25-P, 783-Q
measurement of, 917-Q
residual, 411-Q, 466-Q, 749-Q, 750-Q, 751-Q, 752-Q, 769-Q, 771-Q, 836-Q, 873-Q
during rolling of metals, 263-F
during steel rod drawing, 259-F
Stress analysis. See also Stresses
Stress analysis, 712-Q, 958-Q
of arches, 764-Q
brittle-coating, 40-Q, 771-Q
conference on, 433-Q
dynamometer method for, 56-Q
equipment for, 241-Q, 796-Q
grid-method extension, 430-Q
of metalworking tools, 860-Q
photoelastic, 17-Q, 73-Q, 693-Q, 753-Q, 762-Q, 767-Q, 770-Q, 806-Q, 837-Q, 927-Q, 983-Q, 1037-Q
soap-film technique, 553-Q
strain gage, 23-Q, 384-Q, 558-Q, 768-Q, 785-Q, 812-Q, 957-Q, 228-S
theoretical, 520-Q
x-ray, 216-Q, 765-Q, 873-Q
Stress corrosion, 562-Q, 250-R, 326-R, 331-R, 389-R, 390-R, 510-R, 515-R
Stress relief, 747-K, 542-Q, 752-Q
thermal, 13-J, 19-J
Stress rupture. See Failures or Fractures
Stress-strain properties, 430-Q, 685-Q, 923-Q
Stresscoat methods. See Stress analysis, brittle-coating
Stretch forming. See Forming, stretch
Stringers. See Structures, deformation
Strip metals, 45-F, 281-F, 285-F, 112-H, 33-L, 100-Q
Strip steel. See Steel strip
Strontium, 122-N, 217-P
Structures,
aluminum and alloys in, 4-T, 16-T, 265-T, 268-T, 336-T, 393-T, 486-T, 535-T
amorphous vs. crystalline state, 222-M
atomic, 28-M, 77-M, 444-M, 292-T
cast iron, gray, in, 492-T
cast — welded, 569-K
cathodic protection of steel in, 462-R
coatings, protective, 508-L, 29-R
corrosion, soil, 462-R
Structures (cont.)
crystal, 292-T
absorption-factor tables for spheres, 338-M
analysis of, 55-M
of Beilby layer — oxide film effects, 262-M
calculation of, 336-M, 337-M, 340-M, 369-M, 372-M, 373-M
determination of, 309-M, 418-M
diffraction theory, 375-M
diffraction, x-ray, 317-M
dislocations in, 311-M, 281-N
displacements in, 292-M
distortions in, 374-M, 368-M
effect of internal strains on linear expansion, 461-M
Fourier calculations, 145-M, 371-M
grain-boundary model of, 264-M
imperfections in, 310-M, 312-M, 354-M, 603-P
indexing of powder patterns in, 110-M
measurement of lattice parameters, 110-M
microscopy, electron, 433-M
photography of, 370-M
review on, 474-M
substructures in, 314-M
superlattices in body-centered-cubic, 342-M
topology of, 261-M
x-ray determination of, 286-M, 439-M
x-ray lattice constant, 461-M
deformation, 167-M, 312-M, 354-M, 389-M, 509-Q, 578-Q, 708-Q, 748-Q
design of, 719-K, 70-Q, 162-Q, 936-Q, 508-T
failure analysis of, 8-Q
honeycomb, 448-S
magnetic, 299-P
materials for, 501-T
mechanical properties of metals in, 923-Q
metallic, 574-Q
metals vs. reinforced concrete, 424-T
steels, enameled — in tunnel ceiling, 436-T
steel-tower design, 506-T
superficial, 414-M, 441-S
welded, 259-K, 318-K, 649-Q, 940-Q
welding of, 139-K, 461-K, 464-K, 500-K, 523-K, 590-K, 655-K, 676-K, 677-K, 693-K, 694-K, 711-K, 800-K
Stud welding. See Welding, stud
Submarines, 158-V
Submerged-arc welding. See Welding, submerged-arc
Sulfur, 329-P, 330-P

Sulfur printing, 215-M
Superconducting materials, 176-P
Superconductivity, 152-P, 186-P, 418-P, 502-P
Superfinishing. See also Finishing
Superfinishing, 49-G
Superlattice formation. See also Transformations
Superlattice formation, 133-N
Surfaces,
  electropolished, 203-M
  metallic, 200-L, 203-M, 263-M, 348-P, 355-P, 427-P
  polished, 217-M
Surface-active agents, 940-L, 73-P, 139-R
Surface-area measurement, 20-S
Surface diffusion. See Diffusion, surface
Surface finish, 979-L, 356-S
Surface-finish measurements, 60-L, 118-L, 746-L, 184-S, 340-S, 344-S, 387-S
  electron microscopy for, 262-S
  Faxfilm process for, 195-S
  interferometric, 417-S, 478-S
  of metals, 308-S, 371-S, 456-S
  microscopic, 41-S, 434-S
  optical methods for, 198-S, 207-S
  pneumatic gaging applied to, 492-S
  standards for, 437-S
Surface finishing. See Finishing
Surface roughness. See Surface finish
Surface structures. See Structures, superficial
Surface tension, 60-P, 259-P, 350-P, 351-P, 440-P, 441-P
Surfacing, hard, 287-L, 378-L, 453-L, 608-L, 837-L, 838-Q
Swaging, roll, 306-K
Swarf, 71-A
Sweden,
  steel industry of, 77-B, 162-B
Sylvania Electric Product Co., 462-G

Tanks (military). See also Armor and ordnance
Tanks (military), 217-G, 169-J, 36-K, 860-L, 174-T
Tanks (storage). See also Pressure vessels
Tanks (storage),
  aluminum and alloys for, 415-R, 95-T, 296-T
  cathodic protection of, 58-R, 270-R, 285-R, 287-R, 461-R
  coatings for, 589-L, 804-L, 415-R
  corrosion, hot-water, 432-R, 469-R
  corrosion, prevention of, 589-L, 271-R
Tanks (storage)
  failure of welded water tank, 291-S
  heat treatment of steels for, 227-J
  steel for petroleum storage, 415-R
  stretch forming of aluminum alloys in, 82-G
  welding of, 351-K, 405-K, 512-K, 40-T
  welding,
    arc, 329-K, 421-K, 492-K, 648-K
    gas, 37-K, 329-K
    seam, 515-K, 732-K
    spot, 385-K, 643-K
Tantalum,
  applications of, 177-A, 546-K, 23-V, 146-V, 181-V, 190-V
  casting of, 192-E
  cleaning and finishing of, 23-V
  coatings, ceramic, 37-V
  corrosion of, 222-R, 509-R
  corrosion resistance of, 76-R, 371-R, 549-T
  determination of, 391-S, 497-S, 533-S
  electropolishing of, 383-L
  forging of, 67-F
  formability of, 23-V
  germanium contamination by, 22-N
  machinability of, 23-V
  magnetic properties of, 176-P
  mechanical properties of, 23-V
  melting of, 192-E
  oxidation of, 182-R, 265-R
  photon absorption cross sections in, 593-P
  processing of, 37-V
  production of, 146-V
  properties of, 146-V, 181-V
  proton-scattering cross section, 269-P
  pyrophoric properties of, 455-P
  radiation absorption in, 426-P
  recrystallization kinetics of, 180-N
  resistivity in, 563-P
  rolling of, 67-F
  siliconizing of, 950-L
  silver contamination by, 22-N
  specific heat of, 552-P
  superconductive transition in, 584-P
  superconductivity of, 540-P
  supply situation, 177-A
  weldability of, 23-V
Tantalum alloys,
  chromium, 61-M
  corrosion resistance of, 114-R
  iron-nickel, 155-M
  for metal-nonmetal brazing, 497-K
  molybdenum, 2-M, 235-M, 114-R
  titanium, 462-M, 257-N
Tantalum carbide, 13-V
Tantalum nitride, 195-B

Tantalum ores,
columbium, 18-C
concentration of, 140-B, 310-B
resources of, 146-V
Tantalum oxides, 16-C, 37-C
Tantalum — oxygen system, 244-M
Tantalum powder, 25-H, 244-M
Tantalum-powder products, 244-M
Tantalum single crystals, 1013-Q
Tantalum steels. See Stainless steels, tantalum
Tarnishing, 361-P
Technetium, 145-P
Technical societies
in Great Britain, 265-A
in Switzerland, 265-A
Technology,
century of progress — book, 230-A
Telephone equipment, 632-L, 519-Q, 20-T, 329-T
Tellurium, 124-A, 328-M, 66-P, 78-P, 466-P, 467-P, 491-P
Tellurium alloys,
chromium, 509-P
germanium, 101-M
lead, 188-N
Tellurium coatings, 23-P
Tellurium films, 241-P
Tellurium powder compacts, 34-H
Tellurium single crystals, 522-P, 526-P
Temper brittleness. See also Embrittlement; Brittleness
Temper brittleness, 134-Q, 135-Q, 136-Q, 790-Q
Temperature control. See also Controllers; Pyrometry
Temperature control, 124-S, 211-S
Temperature-control equipment; See also Controllers; Pyrometers; etc. 102-S, 117-S, 119-S, 148-S, 354-S, 502-S, 166-T
Temperature measurement. See also Pyrometry
Temperature measurement, 8-S, 124-S, 186-S, 194-S, 211-S, 343-S, 350-S, 396-S, 502-S, 512-S
Temperature measurement and control, 11-A, 10-S, 17-S, 27-S, 46-S, 49-S, 60-S, 93-S
Temperature-recording equipment. See Temperature-control equipment
Tensile-impact testing. See Tensile testing; or Impact testing
Tensile strength, 73-P, 452-Q, 501-Q
Tensile testing, 52-Q, 100-Q, 103-Q, 214-Q, 566-Q, 669-Q, 822-Q, 841-Q, 917-Q, 1046-Q
Tension, surface. See Surface tension
Terne plating. See Lead plating, tin
Testing,
apparatus for, 616-Q
of metallic materials — book, 747-Q
Testing, nondestructive. See Nondestructive testing
standardization of methods for, 462-S
Textile-processing equipment, 54-E, 463-E, 829-Q, 436-S, 44-T, 196-T, 288-T, 311-T, 327-T
Thallium, 91-G, 254-G, 207-L, 245-P, 322-S, 341-S
Thallium alloys,
antimony-tin, 154-N
indium, 520-P
lead, 118-M, 287-Q
Thermal analysis. See also Expansion, thermal
Thermal analysis, 1-M, 398-M, 369-S
Thermal expansion alloys, 144-T
Thermit processes. See Welding, thermit
Thermit welding. See Welding, thermit
Thermocouples. See also Temperature measurement; Pyrometry; Thermocouple alloys
Thermocouples, 86-P, 574-P, 35-Q, 22-S, 123-S, 238-S, 276-S, 318-S, 404-S, 405-S, 410-S, 519-S
Thermocouple alloys, 130-S, 144-T
Thermocouple wires. See Thermocouples; Thermocouple alloys
Thermodynamic properties, 4-M, 65-P, 86-P, 114-P, 167-P, 300-P, 64-S
Thermoelastic analysis. See Thermal Analysis
Thermometry. See Temperature measurement; Pyrometry
Thickeners, 171-B
Thickness measurement. See also Gaging
Thickness measurement, 29-S, 104-S, 108-S, 193-S, 325-S, 398-S, 408-S, 442-S
Thorium,
combustion heat of, 428-P
determination of, 221-S, 359-S, 409-S
determination of hydrogen in, 197-S
determination of nitrogen in, 197-S
determination of oxygen in, 197-S
elasticity modulus of, 879-Q
foundry practice, 192-E
machining of, 91-G, 254-G
neutron transmission cross section of, 277-P
Poisson's ratio of, 879-Q
properties of, 368-P, 201-V
separation from titanium and zirconium, 48-C
shear modulus of, 879-Q

Thorium alloys, 64-M, 386-P
aluminum, 391-M
manganese, 65-M, 353-M
selenium, 359-M, 391-M
Thorium foils, 407-P
Thorium hydride, 26-H
Thorium nitride, 195-B
Thorium ores, 271-B, 6-S, 409-S, 472-S, 201-V
Thorium powder, 26-H, 95-H
Timken 16-25-6 alloy. See Iron alloys, chromium-molybdenum-nickel
Tin,
in aluminum alloys, 15-G
antimony determination in, 416-S
arsenic determination in, 416-S
coatings, dip, 637-L
coating for copper alloys, 403-L
conservation of, 366-A, 227-T
contact melting with bismuth, 101-N
contact melting with zinc, 101-N
corrosion of, 111-R, 388-R, 516-R
creep of, 1052-Q
deformation from hardness test indenters, 448-Q
determination of, 48-S, 222-S, 450-S, 160-V
diffusion, self, 102-N
distillation, vacuum, 97-C
economic trends, 95-A, 204-A, 226-A, 160-V
in electrical equipment, 358-T
electrocrystallization of, 55-C
electrodeposition of, 380-L, 397-L
electrometallurgy of, 141-C
emissivity, thermionic, 151-P
free energy, interfacial, 441-P
frictional properties of, 572-Q
grain growth of, 18-N
gray, 149-N, 70-P
gyromagnetic effect in, 404-P
high-purity, 97-C, 299-N, 335-P, 395-P
impact strength at low temperatures, 585-Q
interaction with beta-rays, 370-P
meson capture by, 341-P
metallurgy, extractive, 87-C
microscopy, polarized-light, 391-M
molten, 544-K, 185-M, 165-N, 500-P, 560-P, 294-R
passivation of, 243-R
patternmaking for, 609-E
plastic deformation of, 286-Q
polishing, metallographic, 594-L
production and consumption of, 27-A, 203-A
radiation absorption in, 426-P
reflectivity of polarized light from, 483-P
Tin (cont.)
resistivity of, 371-P
shear strength of, 564-Q
slip in bicrystals of, 735-Q
in solders, 160-V
solidification shrinkage of, 377-E
solubility in aluminum, 138-N
specific heat of, 216-P, 552-P
structure, crystal, 8-M, 287-P
superconductivity of isotopes, 292-P, 293-P
superconducting-normal transition, 15-P
superconductivity properties of, 239-P, 244-P, 245-P, 287-P
surface tension at melting point, 259-P
technical trends, 205-A
technology of, 202-V
tensile strength of, 143-Q
thermodynamic properties of, 216-P
transformations, allotropic, 167-N
twinning in, 476-M
viscosity of, 153-P
whisker growth on, 414-Q
Tin and alloys,
aluminum determination in, 385-S
coatings, dip, 911-L
corrosion resistance of — book, 426-R
electrodeposition of, 911-L
Tin alloys
aluminum, 294-R
aluminum-indium, 187-M
antimony, 11-Q, 294-R
antimony-lead, 154-N
antimony-thallium, 154-N
bismuth, 116-C, 165-E, 294-E
bismuth-cadmium, 422-M, 581-P
bismuth determination, spectrographic, 15-S
cadmium, 294-R
cadmium-lead-zinc, 153-M
copper, 15-C, 20-N, 1047-Q, 144-R, 294-R, 344-R
copper-lead, 238-R, 336-R
copper-magnesium, 410-M
die casting of, 158-E, 399-E
fluidity of, 107-E
lead, 165-E, 377-E, 358-L, 594-L, 396-P, 143-Q, 1052-Q, 294-R, 12-S
lithium, 294-R
magnesium, 294-R
magnesium-silver, 297-N
nickel, 58-L
plating of, 238-L
silver, 947-L, 529-Q
sodium, 74-P, 294-R
titanium, 89-M
zinc, 425-E, 294-R
zirconium, 385-M

Tin bronzes. See Bronzes, tin
Tin coatings, 786-K, 500-L, 764-L, 805-L, 508-P, 1-R, 17-R, 426-R, 160-V
hot-dip, 24-L, 57-L, 191-L, 214-L, 709-L
Tin electrodeposits, 786-K, 647-L, 973-L, 510-R
nickel, 58-L, 861-L
zinc, 861-L
Tin films, 566-P
Tin industry, 189-A
Tin ingots, 475-S
Tin ores,
antimony-copper-lead, 76-C
concentration of, 187-B, 188-B, 304-B, 363-B
crushing and grinding, 363-B
flotation of, 137-B, 313-B
lead, 49-A
magnetic separation of, 187-B, 188-B
mining of, 363-B
resources of, 160-V
smelting of sulfide-type, 469-P
tabling of, 187-B, 188-B
Tin plating, 414-L, 568-L, 570-L, 827-L
antimony, 478-L
cadmium, 718-L
copper, 93-L, 719-L
lead, 606-K, 167-L
nickel, 93-L, 133-L, 823-L, 861-L
solutions for, 157-L, 722-L
zinc, 93-L, 133-L, 823-L, 861-L
Tinplate. See also Tin; Tin electrodeposits; Steels; etc.
Tinplate,
annealing, continuous, 139-J
British plant, 154-F, 161-F, 165-F
coating of, 133-L, 823-L
coatings for, 808-L, 91-R
corrosion inhibitors for, 485-R
corrosion resistance, food, 227-T
demand and supply of, 240-A
heat-treatment furnace for, 86-J
in metal decorating plants, 877-L
phosphorus content — Russian practice, 161-D
production of, 189-A, 234-F, 305-F, 517-L
substitutes for, 227-T
surface preparation for painting, 601-L
Tin powder products,
properties of, 356-Q
Tin Research Institute, 5-A
Tin scrap, 75-A
Tin single crystals, 376-M, 449-M, 247-N, 250-N, 1070-Q
Tin tubing (collapsible), 349-G
Titanium, 93-V, 105-V
aging, strain, 880-Q
Titanium (cont.)
in aircraft, 141-G, 195-G, 43-T, 68-T, 79-T, 164-T, 318-T, 510-T, 7-V, 61-V
for aluminum-alloy grain refinement, 35-E, 191-E
annealing of, 293-T
application of, 177-A, 297-B, 462-T, 8-V, 23-V, 65-V, 131-V, 136-V, 140-V, 158-V, 190-V
bibliography on, 47-A
brazing of, 148-V
casting of, 192-E
cleaning of, 23-V
corrosion of, 54-R, 423-R
corrosion resistance of, 76-R, 66-V, 124-V, 129-V
deformation of, 61-V
design for, 233-G
determination of, 336-S, 338-S, 348-S, 358-S, 450-S, 542-S
determination of hydrogen in, 197-S
determination of nitrogen in, 197-S, 383-S
determination of oxygen in, 197-S
drawing of, 455-G
economic trends, 95-A, 180-A, 226-A, 333-A, 60-T, 106-V
elasticity modulus of, 879-Q
in engines, aircraft, 273-T, 295-T, 355-T
in engines, jet, 496-Q
extraction of, 69-V
extrusion, hot, 171-F, 198-F, 205-F, 208-F, 228-F
fabrication of, 233-G, 318-T, 9-V, 140-V, 148-V, 192-V
finishing of, 23-V
forging of, 73-F, 290-F, 148-V, 192-V
formability of, 229-G, 23-V
forming of, 23-G, 52-G, 144-G, 341-G, 347-G, 455-G, 43-T, 164-T, 293-T, 12-V, 61-V, 148-V
Gmelin's handbook, 151-V
grinding of, 22-G, 31-G, 149-G, 360-G, 516-G
hardening, case, 278-J
in heat-resisting alloys, 382-M
heat treatment of, 43-T, 164-T, 293-T, 61-V, 148-V
machinability of, 43-G, 347-G, 376-G, 447-G, 23-V
machining of, 137-G, 214-G, 515-G, 12-V, 61-V, 66-V, 148-V, 180-V, 192-V
magnetic resonance of, 144-P
as manganese substitute in steels, 229-D
mechanical properties of, 43-G, 229-G, 445-Q, 23-V, 129-V, 148-V
melting of, 58-C, 192-E, 495-E, 578-E, 192-V

Titanium (cont.)
metallography of, 388-M
metallurgy of, 301-A, 89-C, 151-V, 166-V
microscopy, polarized-light, 391-M
neutron-transmission cross section, 268-P
in nickel alloys, 463-S
in nuclear reactors, 134-T
nucleation of, 571-E
occurrence of, 69-V
oxidation of, 224-R, 229-R, 265-R, 360-R
passivation in hydrochloric acid, 507-R
physical properties of, 43-G, 445-Q, 129-V, 148-V
plastic deformation in, 191-Q
Poisson's ratio of, 879-Q
pole figures of, 271-M
potentials in sea water, 369-R
powder metallurgy of, 111-B
press forming of, 23-G
production of, 99-B, 111-B, 3-C, 6-C, 18-C, 29-C, 42-C, 81-C, 132-C, 516-P, 8-V, 43-V, 140-V, 180-V
properties of, 176-Q, 8-V, 9-V, 53-V, 55-V, 65-V, 66-V, 124-V, 140-V, 158-V
reaction of heated surfaces with TiI_4, 516-P
recovery from beach sands, 244-B
recovery from magnetite, 350-B
refining of, 118-B, 59-C
research on, 132-C
scaling in nitrogen atmosphere, 224-R
separation from zirconium and thorium, 48-C
shear modulus of, 879-Q
shell molds for, 644-E
specific heat of, 501-P
specifications for, 334-S
in steels, 271-Q, 463-S
strength — weight ratio for, 981-Q
structure,
crystal, 239-M
deformation, 533-Q
as substitute metal, 156-C
supply situation, 177-A
symposium on — book, 83-V
technology of — book, 209-V
tensile strength of, 357-Q, 880-Q
vacuum refining of, 46-C
weldability of, 23-V
welding of, 210-K, 252-K, 43-T, 164-T, 148-V, 180-V, 192-V
welding,
gas-shielded arc, 803-K
resistance, 439-K
spot, 341-G, 439-K, 803-K, 61-V
submerged-arc, 439-K
workability of, 23-G, 69-V

Titanium and alloys,
in aircraft, 114-V, 132-V
applications of, 431-T, 54-V, 111-V, 166-V
cleaning of, 111-V
fabrication of, 166-V
finishing of, 111-V
forging of, 114-V, 132-V
forming of, 111-V
heat treatment of, 25-Q, 111-V
machining of, 209-G, 111-V, 114-V, 132-V
mechanical properties of, 134-C, 25-Q, 431-T, 54-V, 111-V, 114-V, 132-V
microstructure of, 134-C
phase diagrams of, 268-M
production of, 134-C, 12-V
properties of, 250-K, 12-V, 69-V
riveting of, 229-G
weldability of, 111-V
welding of, 250-K, 448-K, 114-V, 132-V

Titanium alloys, 182-A
aluminum, 9-C, 107-E, 9-M, 60-M, 90-M, 151-M, 236-M, 188-N
aluminum-nickel, 441-M
beryllium, 119-M
carbon, 5-M
chromium, 470-M, 257-N, 114-R
columbium, 11-M, 257-N
compositions of, 151-V
copper, 256-M, 284-M
corrosion fatigue of, 214-R
corrosion resistance of, 114-R
cutting of, 143-G
cutting fluids for, 146-G, 150-G
in design, 194-V
drilling and reaming of, 148-G, 427-G
expansion, thermal, 881-Q
fatigue strength of, 881-Q
forming of, 427-G
gold, 246-M, 256-M
hardness of, 881-Q
heat treatment of, 51-V
for high temperatures, 166-V
impact strength of, 881-Q
iron, 55-J, 210-J, 257-N, 360-R
iron-chromium, 130-N
machinability of, 447-G
machining of, 120-G
manganese, 257-N
mechanical properties of, 51-V
melting of, 166-C
for metal-nonmetal brazing, 497-K
metallurgy of, 11-V, 12-V
nickel, 325-M
nitrogen, 5-M
oxidation, high-temperature, 214-R
oxygen, 5-M, 280-M, 285-M, 384-M, 395-M

Titanium alloys (cont.)
phase designations for, 195-M
platinum, 246-M
silicon, 147-C
silver, 256-M
in stainless-steel production, 146-D
stamping of, 427-G
structure, crystal, 88-M
tantalum, 462-M, 257-N
tapping, 148-G
tensile strength of, 881-Q
tin, 89-M
transformations in, 54-N, 119-N
tungsten, 257-N
in turbines, gas, 214-R
vanadium, 237-M
welding of, 597-K, 603-K, 671-K, 687-K, 705-K, 734-K, 780-K
zirconium, 41-M, 175-N
Titanium-alloy sheets, 440-K
Titanium boride, 173-M, 279-M
Titanium carbides, 120-C, 164-Q, 60-V, 100-V
Titanium carbide alloys,
iron, 124-Q
nickel, 124-Q
Titanium carbide cermets, 499-R
Titanium carbide compacts, 4-H
Titanium carbide powder products, 54-H
Titanium cast irons. See Cast irons, alloy, titanium
Titanium castings, 571-E
Titanium chlorides, 29-C, 81-C
Titanium coatings, 764-L
Titanium hydride, 26-H
Titanium ingots, 57-C
Titanium iodide, 164-C
Titanium nitride, 303-B, 254-T
Titanium ores,
concentration of, 60-B, 111-B
extraction of, 156-C
flotation of, 192-B
iron, 19-B, 135-C
reduction of, 19-C, 89-C, 129-V
resources of, 60-B, 297-B, 341-B, 55-V, 124-V, 151-V, 192-V
smelting of, 129-C, 130-C
vanadium recovery from, 192-B
zirconium, 186-B
Titanium plating, 542-L, 630-L, 758-L
Titanium powders, 23-C, 26-H, 758-L
Titanium-powder products, 100-H
Titanium sheets, 25-G, 226-G, 375-G, 44-K, 440-K, 748-L, 880-Q, 293-T, 148-V
Titanium slags, 320-B
Titanium steels. See Steels, alloy, titanium; or Stainless steels, titanium
Titanium tubing, 17-K
Titanium welds, 44-K, 439-K
Tools, carbide. See Carbide Tools
Tools,
cutting, 369-E, 473-G, 69-K, 914-Q
alloys for, 33-V
aluminum alloy for, 38-G
cast alloy, 548-T
design of — book, 425-G
durability of, 190-G
failures of, 454-G
force and temperature measurement of, 293-G
geometry of, 129-G
grinding of, 33-V
hardness testing of, 544-Q
inspection of, 33-V
metalworking, 68-G, 15-J, 860-Q. See also Tools, cutting; or Tool and forming materials
radioactive tracers for life study, 53-G, 321-G
rotary-type for lathes, 408-G
sintered carbides as, 37-G
toollife, 298-G
wear determination of, 105-G, 452-G, 453-G, 512-Q
woodworking, 52-T
Tool and forming materials. See also Tools, cutting
Tool and forming materials, 251-G, 15-J, 46-V
Toolsteels,
for aluminum-magnesium-silicon alloys, 914-Q
applications of, 842-Q, 72-T, 210-T, 120-V, 121-V
brazing to carbon steel, 69-K
carbides in, 270-M, 627-Q
carbide formation in, 127-N
chromium, 182-M
chromium-tungsten, 262-G
coating of, 365-L
compositions of, 45-V, 121-V, 154-V
cutting of, 128-G
cutting fluids for, 146-G, 468-G
for cutting and milling operations, 249-G
development of, 323-A
for dies, 575-E, 148-J, 530-T
directory of, 120-V
for drills, twist, 419-T
for extrusion of nonferrous metals, 82-F
finishing of, 121-V
forging of, 81-Q, 33-V
for forming, 147-T
fractures of, 166-Q, 506-Q, 729-Q, 908-Q
hardenability of, 239-J
hardenability testing of, 467-S
hardening of, 23-J, 189-J, 202-J, 212-J

Toolsteels (cont.)
hardness of, 255-J, 627-Q
hardness, hot, 791-Q
hardness testing of, 648-Q
heat treatment of, 60-J, 96-J, 117-J, 148-J, 162-J, 191-J, 225-J, 239-J, 272-J, 791-Q, 82-T, 162-T, 420-T, 33-V, 120-V, 121-V, 154-V
hot topping of ingots, 222-D
impact strength of, 239-J, 408-Q
impact testing of, 1057-Q
inclusion elimination in, 300-D
for investment casting, 18-E, 277-T
machinability of, 154-G, 191-G, 284-G, 506-G
machining of, 201-G, 290-G, 297-G, 363-G, 463-G, 112 T
manganese, 240-J
manganese determination, 447-S
mechanical properties of, 217-T, 434-T
metallurgy, physical, 142-V
microstructure of, 419-T, 142-V
molybdenum, 262-G
molybdenum-nickel, 64-J, 172-J
molybdenum-tungsten, 262-G
new, 154-S
nitriding for increased life, 1049-Q
peening of, 23-J
production of. See Steelmaking
properties of, 162-T, 33-V, 60-V, 121-V, 154-V
quenching of, 282-L
rare-earth effects, 190-B
research in, 63-V
rolling of, 311-F
sand casting of, 253-E
segregation in, 302-N, 1057-Q
silicon determination, 447-S
standards for, 467-S
structure, crystal, 161-M
supply situation, 129-A
surfacing, hard, 317-L, 420-T
tempering of, 149-J, 239-J, 45-V
tensile strength of, 1004-Q
tensile testing of, 1004-Q
for tools, woodworking, 52-T
toughness of, 81-Q
for trimming steel forgings, 420-T
tungsten, 417-M
wear resistance of, 512-Q
weldability of, 580-K
welded edges for shears, 848-L
welding, arc, 108-K, 498-K, 564-K, 704-K
zinc alloys in, 377-T
Torsion testing, 379-Q, 553-Q, 841-Q
Toughness, 228-Q, 923-Q
Toys, 61-G
Tractors, 479-G, 192-J, 558-K, 636-K, 87-L, 541-L, 555-L, 658-L, 335-T
Trade names
directory for, 375-A
Trailers, 348-K
Tramp iron, 465-S
Transformations, 10-N, 11-N, 21-N, 25-N, 162-N, 194-N, 256-N, 275-N, 321-N, 300-P, 390-P, 490-P, 126-Q, 749-Q
Transformer sheets, 52-M, 62-P
Triboelectric effect, 64-S
Trimming. See Shearing
Trucks, automotive. See also Automobiles
Trucks, automotive, 469-G, 350-K, 588-K, 685-L, 832-Q, 5-T, 263-T, 266-T
Trucks, fork-lift, 28-K
Tubes (collapsible), 902-L
Tubing. See also Pipe
Tubing, 124-F, 183-F, 184-F, 185-F, 186-F, 189-F, 190-F, 194-F, 225-F, 239-F, 17-K, 525-K, 236-R
Tukon testing. See Hardness testing
Tumbling, 137-L, 277-L, 302-L, 313-L, 391-L, 923-L, 989-L
Tungsten,
annealing of, 37-N, 159-N
applications of, 177-A, 35-E, 545-L, 23-V, 137-V, 138-V
cleaning and finishing of, 23-V
coatings, ceramic, 37-V
corrosion, chemical, 394-R, 509-R
corrosion resistance of, 371-R, 549-T
creep of, 962-Q
crystal growth of, 47-N
determination of, 338-S, 358-S, 415-S
diffusion into ferrous metals, 407-M
economic trends, 95-A, 104-A, 226-A
electrical-contact resistance, 495-P
electrode potentials of, 338-P
electropolishing of, 495-P
etching, electrolytic, 495-P
filament design, 476-L
forging of, 67-F
formability of, 23-V
hardness of, 351-Q
machinability of, 23-V
magnetic properties of, 479-P
mechanical properties of, 23-V
metallurgy, extractive, 101-C
neutron cross section of, 47-P
oxidation resistance of, 351-Q
oxygen adsorption on, 355-P
polishing, mechanical, 495-P
preparation of, 138-V
processing of, 37-V
properties of, 138-V
proton-scattering cross section, 269-P
reaction of heated surfaces with Ti I_4, 516-P

Tungsten (cont.)
recrystallization of, 37-N, 159-N
resistivity at low temperatures, 479-P
rolling of, 67-F
siliconizing of, 950-L
supply situation, 177-A
swaging of, 37-N, 159-N
tensile strength of, 351-Q
weldability of, 23-V
welding to aluminum, 690-K
welding, resistance, 99-K
Tungsten alloys, 247-E, 150-G
chromium, 326-M
chromium-molybdenum-nickel, 484-G
cobalt, 428-M
cobalt-molybdenum, 172-L, 857-L
iron, 407-M
molybdenum, 1-M
silicon, 458-M
silver, 327-S
titanium, 257-N
Tungsten borides, 279-M
Tungsten carbide, 18-H
applications of, 21-T, 76-T, 81-T, 83-T, 538-T, 539-T, 133-V
blanking and piercing tools of, 119-G, 130-G
cobalt, 429-M
deformation from hardness-test indenters, 448-Q
in dies, 91-H
direct production from ore, 128-C
flame plating, 887-L, 894-L, 897-L, 905-L, 916-L, 938-L
hard facing with, 317-L
machining of, 99-G, 206-G, 450-G
microscopy, polarized-light, 391-M
powder metallurgy of, 92-H
production of, 1-H, 18-H, 124-H
sintering of, 42-H
for surfacing, hard, 21-T
wear measurement in dies, 50-Q
wear resistance of, 237-Q, 289-Q, 110-T
Tungsten carbide alloys,
cobalt, 110-H, 111-H, 131-Q, 366-Q, 13-V
nickel, 110-H
Tungsten carbide compacts, 1-H
Tungsten carbide powders, 1-H, 75-H
Tungsten carbide powder products, 11-H
Tungsten ores, 143-B, 184-B, 236-B, 128-C, 1-H
Tungsten plating, 542-L
Tungsten powders, 1-H, 25-H, 53-H, 95-H, 111-H
Tungsten-powder products, 120-H
Tungsten single crystals, 1013-Q
Tungsten steels. See Toolsteels, tungsten
Tungsten welding electrodes, 546-K
Tungsten wires, 651-L, 333-M, 192-S
Turbines, 122-F, 109-R
Turbines, air-expansion, 61-T
Turbines, gas,
alloys for, 214-R, 145-V
blades, 220-F, 55-Q, 124-T
book, 220-T
cobalt alloys for, 72-H
corrosion of, 283-R
creep strength of Ni alloys for, 949-Q
fabrication of, 24-T
failures, service, 55-Q, 392-S
gages for blades, 361-S
heat-resisting alloys for, 37-T, 221-T, 302-T
heat treatment of Stellite blades, 4-J
light alloys for, 94-T
heat-resisting materials for, 220-Q, 246-Q, 24-T, 168-T, 215-T, 216-T, 361-T, 370-T, 385-T
powder metallurgy in production of, 32-H
sintered materials for, 85-H
stainless steels in, 161-V
steels for, 148-T, 149-T
in steel industry, 98-A
welding of sheet metals for, 448-K
Turbines, steam, 220-Q, 916-Q, 1012-Q, 196-R, 72-S, 145-V
Twinning, 17-N, 501-Q, 568-Q
Twist testing. See Torsion testing
Twisting, 521-Q

Ultrasonics. See also Nondestructive testing, ultrasonic
Ultrasonics, 325-A, 438-S, 477-S, 490-S, 500-S
U. S. Steel Co.,
history of — book, 87-A
Uranium,
combustion heat of, 428-P
determination of, 67-S, 359-S, 409-S
determination of alpha energy in, 559-P
determination of hydrogen in, 197-S
determination of nitrogen in, 197-S
determination of oxygen in, 197-S
economic trends, 95-A, 333-A
elasticity modulus of, 879-Q
electropolishing, metallographic, 390-M
expansion, thermal, 374-P
foundry practice, 192-E
machining of, 91-G, 254-G
magnetic susceptibility of, 115-P
metallography of, 390-M
metallurgy, extractive, 305-A, 399-T
microscopy, polarized-light, 390-M, 391-M

Uranium (cont.)
microstructure of, 390-M
oxidation of, 110-R, 136-R
plastic deformation of, 326-Q
Poisson's ratio of, 879-Q
properties of, 201-V
reflectivity of polarized light from, 483-P
resources of, 305-A
shear modulus of, 879-Q
slip in, 147-M
solubility in liquid sodium, 118-P
specific heat of, 305-P
structure, crystal, 142-M
transformations of, 185-N
twinning in, 147-M
zinc electrodeposition on, 982-L
Uranium and alloys, 386-P
Uranium alloys, 64-M
aluminum, 391-M
carbon, 31-M
lead, 174-M
magnesium, 391-M
Uranium bars, 328-Q
Uranium carbide, 195-B, 12-M, 188-M
Uranium dioxide, 195-B
Uranium hydride, 26-H
Uranium nitride, 195-B
Uranium ores,
analysis of, 6-S, 409-S
Canadian resources, 23-B
concentration of, 305-A, 201-V
resources of, 109-B, 129-B
Colorado, 174-B
North Africa, 150-B, 151-B
South Africa, 341-B
uranium determination in, 472-S
vanadium, 52-B, 53-B
Uranium powder, 26-H
Uranium single crystals, 185-N

Vacuum deposition, 67-L, 520-L
Vacuum metallurgy, 66-C, 84-C
book, 302-M
Valves, 410-E, 346-K
Vanadium,
applications of, 23-V
cleaning and finishing of, 23-V
corrosion, salt-water, 24-V
determination of, 348-S, 358-S
determination of hydrogen in, 197-S
determination of nitrogen in, 197-S
determination of oxygen in, 197-S
elasticity modulus of, 879-Q
fabrication of, 24-V
ferrous metals impregnation with, 747-L

Vanadium (cont.)
formability of, 23-V
grain orientation, preferred, 704-Q
high-purity, 397-M
machinability of, 23-V
mechanical properties of, 23-V, 24-V
neutron-scattering cross section of, 481-P
neutron-transmission cross section, 268-P
physical properties of, 24-V
Poisson's ratio of, 879-Q
production of, 149-V
recovery of, 65-B, 69-B, 88-B, 192-B
shear modulus of, 879-Q
specific heat of, 552-P
in steelmaking, 149-V
superconductivity of, 116-P
susceptibility, magnetic, 24-V
weldability of, 23-V
Vanadium alloys, 40-V
aluminum, 188-N
manganese, 281-M
nickel, 66-M, 245-M, 393-M, 200-N
titanium, 237-M
Vanadium carbide, 481-P
Vanadium ores, 149-V
uranium, 52-B, 53-B
Vanadium oxides, 19-B, 16-C
Vanadium-oxygen system, 80-M
Vanadium steels. See Steels, alloy, vanadium
Verein Deutscher Eisenhüttenleute, 283-A
Vibration damping, 126-Q, 911-Q, 926-Q
Vibrational properties. See Fatigue Strength
Vibrations, sonic, 145-S
Vibration testing. See Fatigue testing
Vickers hardness. See Hardness
Vickers testing. See Hardness testing
Vitallium. See Cobalt alloys, chromium-molybdenum-nickel
Vitreous enameling. See Enameling, porcelain

Wastes. See also Scrap; Air pollution
Wastes, 18-A, 55-A, 140-A
Waste gases, 195-A
Waste-treatment, 21-L
Watches and clocks, 66-L, 175-T, 180-T, 181-T, 452-T
Water, 322-R
Water corrosion. See Corrosion, water
Wax coatings. See Coatings, wax
Wear, 158-Q, 281-Q, 292-Q, 397-Q, 577-Q, 647-Q, 810-Q, 852-Q, 1024-Q, 1042-Q, 325-R, 429-R, 292-S

Wear resistance, 27-Q, 95-Q, 97-Q, 99-Q, 237-Q, 446-Q, 524-Q, 809-Q, 923-Q, 955-Q, 305-R
Wear resisting alloys, 182-G, 251-Q, 289-Q
Wear testing, 146-Q, 158-Q, 180-Q, 412-Q, 724-Q
Weathering. See Corrosion, atmospheric
Weirton Steel Co., 331-A
Welds,
annealing of, 93-J
arc, 254-Q
butt, 203-K
chemical attack of, 356-R
cleaning of, 727-K
design of fillet-type, 505-K
elongation of, 309-K
fatigue strength of, 244-Q
mechanical testing of, 441-K
microscopy, optical, 349-M
microstructure of, 595-K
nondestructive testing
radiographic, 177-S, 259-S, 395-S, 518-S
ultrasonic, 389-S
plug, 794-K
preheating and controlled cooling of, 503-K
resistance, 621-K, 703-K
spot, 354-K, 504-K, 526-R
stresses in, 507-K
stress corrosion of, 68-R
stresses in fillet-type, 505-K
structures, crystal, 484-K
submerged-arc, 344-K
testing of, 153-K, 670-K, 74-R
Weldability, 381-K, 382-K, 383-K, 422-K, 484-K, 488-K, 669-K, 686-K
Weld-deposited coatings, 165-L, 225-L, 409-L, 754-L, 50-N
Welding, 369-E, 200-K, 355-K, 635-K
acetylene-oxygen, 20-K, 325-K
aluminothermic, 631-K
applications of, 83-G, 204-G, 437-G, 438-G, 462-G, 11-K, 258-K, 427-K, 635-K, 672-K, 708-K, 737-K
arc,
apparatus for arc, 54-K
applications of, 95-K, 154-K, 283-K, 416-K, 541-K, 614-K, 638-K, 699-K, 721-K, 20-T
automatic, 340-K
book, 324-K, 537-K
current measurement and recording, 475-K
current strength vs. flux translucency, 627-K
design for, 98-K, 499-K
direct-current, 100-K
Welding (cont.)
arc (cont.)
electrode bundles for, 23-K, 197-K
electrodes for, 57-K, 232-K, 315-K, 340-K, 422-K, 425-K, 435-K, 685-K
equipment for, 119-K, 134-K, 169-K, 262-K, 273-K, 320-K, 337-K, 415-K, 506-K, 587-K, 678-K, 779-K
fluxes for, 431-K
flux translucency vs. current strength, 627-K
of galvanized metals, 244-K
German process, 15-K
Humboldt-Meller process, 523-K
International Commission report on, 318-K
low and high current, 88-K
multi-electrode, 483-K, 518-K
porosity in, 788-K
process control in, 196-S
regulation of, 401-K
saturable-reactor control for, 87-K
of steels — gases and inclusions in, 654-K
theory of, 422-K
thermal effects, 112-K, 292-K
time study of, 508-K
transformer output in, 379-K
twin process, 425-K
weld radiographs of, 494-S
arc striking — theory of, 373-K
argon-arc, 53-K, 101-K, 365-K, 479-K, 556-K
autogenous. See Welding, resistance
automatic, 517-K
at Automatic Welding Co., Los Angeles, 647-K
book, 518-E, 79-G, 129-K, 670-K
bronze. See Brazing
calculations for, 430-K
cost and quality factors, 73-K
crack formation during, 488-K
design for, 274-G, 508-T
developments in, 233-K
education for, 359-K
electrodes, 447-K, 466-K, 472-K, 479-K, 481-K, 487-K, 490-K, 501-K
coatings for, 459-K, 473-K, 493-K, 524-K, 527-K
electronic equipment for — book, 179-K
flame. See Welding, gas or specific gas-welding processes
flash, 256-G, 432-K, 478-K, 480-K, 596-K, 650-K
at Flohr & Co., Seattle, 649-K
fundamentals of, 800-K
gas, 161-K, 428-K, 557-K, 558-K, 769-K

Welding (cont.)
gas-shielded-arc. See also Welding, argon-arc; Welding, helium-arc. 63-K, 249-K, 446-K, 617-K, 622-K, 657-K, 750-K
in Great Britain, 176-K
helium-arc, 105-K, 332-K, 593-K
hermetic, 74-R
hidden-arc. See Welding, submerged-arc
inert-gas-shielded. See Welding, gas-shielded-arc; Welding, Argon-arc; or Welding, helium-arc
instrumentation for, 656-K
macro- and microphotography in, 349-M
magnetic chucks for, 32-G
at Marion Power Shovel Co., 77-K
materials for — book, 180-K
nonferrous metals — book, 602-K
plastic tooling in, 728-K
practices in — book, 601-K
preheating for, 358-K
pressure, 18-K, 578-K, 642-K, 723-K
productivity in — British report, 539-K
recent developments in, 162-K
research on, 293-A, 56-K, 79-K
resistance, 412-K, 502-K, 612-K, 713-K, 744-K
of aircraft structures, 10-K
book, 128-K, 809-K
controls for, 165-K
electrical problems in, 85-K, 86-K
equipment for, 52-K, 257-K
improved process, 753-K
interference between equipment, 85-K
International Commission report on, 318-K
machine for, 563-K
quality control, statistical, 621-K, 703-K
research, British, 62-K, 240-K
specifications, government, 621-K, 703-K
of steels, alloy, 13-K
review on, 316-K
Russian progress in, 263-K
seam, 620-K, 889-L
selection of process, 660-K, 757-K
specifications — Australia, 624-K
in shipbuilding — Finland, 12-K
spot, 184-K, 532-K, 568-K, 576-K, 1025-Q
applications of, 136-K, 555-K, 614-K, 620-K, 623-K, 699-K
control apparatus for, 370-K, 802-K
defects in, 471-K
electronics in, 44-S
equipment for, 61-K, 141-K, 241-K, 608-K
machine for, 754-K, 755-K
models in study of, 491-K
Welding (cont.)
spot (cont.)
resistance variations during, 19-K, 361-K
of thick sheets, 331-K
stresses resulting from 19-J, 507-K
for structural engineers - book, 771-K
stud, 27-K, 212-K, 335-K, 700-K
submerged-arc, 222-K, 733-K
arc characteristics, 433-K
at Atlas Steels, Ltd. 772-K
of cast steel slag pots, 453-K
equipment for, 21-K, 626-K
of eyebolts, 658-K
fixtures for, 16-K
glass back-up tape for, 514-K
hard facing, 288-L, 754-L
multiple-rod method, 91-K
Russian, 375-K
semi-automatic, 789-K
of steels, 58-K
three-phase power, 550-K
theory of, 595-K, 724-K
thermit, 639-K, 863-Q
Unionmelt. See Welding, submerged-arc
in U. S. — German report, 661-K
in U.S.S.R., 522-K
temperature control in, 503-K
Welding arcs, 506-K
Welding electrodes. See also Welding rods
Welding electrodes, 73-K, 747-K
arc, 577-K, 653-K
argon-arc,
for aluminum and alloys, 629-K
coated, 651-K, 685-K, 494-T
fabrication of, 735-K, 241-T, 242-T, 243-T
ferritic, 604-K
coatings for, 113-K, 276-K, 284-K, 315-K
gas-shielded-arc, 622-K
hydrogen in, 552-K
lime-ferritic, 359-T
of stainless steels, 260-K, 271-K, 765-K
for steels, 82-K, 118-K, 241-T
storage of, 739-K
for surfacing, hard, 838-Q
testing of, 684-K
for toolsteels, 243-T
Welding fluxes, 58-K, 72-K, 114-K, 115-K
Welding industry
statistical review — 1951, 565-K
Welding rods. See also Welding electrodes
Welding rods, 4-K
Welding tips, 268-K
Well-drilling equipment, 30-K
Western U. S.,
resources of, 39-B

Westinghouse Electric Corp., 294-A
Wetting agents. See Surface-active agents
Wheels, 355-E, 195-F
White cast iron. See Cast iron, white; or Cast iron, malleable
Wiping. See Soldering
Wires,
abrasion resistance of, 907-L
aging vs. relaxation properties, 140-Q
annealing, bright, 176-J
cleaning, mechanical, 699-L
coatings, enamel, 330-L
gaging, mechanical, 257-S
heat treatment of, 113-J
mechanical properties of, 279-F
plating of, 462-G
Signal Corps research and needs, 51-T
stitching with, 341-K
stress-strain relations of, 282-Q
tensile testing of, 100-Q
thermoelectric properties of fine, 31-P
torsion testing of, 80-Q
Wire cloth, 119-F, 3-R
Wire drawing, 38-F, 78-F, 99-F, 215-F
back-pull, 279-F
bonderizing for, 214-F
calculations for, 278-F
calculation of economic lot sizes, 236-F
die-pressure measurement in, 164-F
dies. See Dies, wire-drawing
equipment for, 25-F, 38-F, 55-F, 106-F, 279-F
forces and tensions in, 174-F
friction and wear in, 139-F, 306-F
in locked-coil rope production, 51-F
lubricants for, 23-F, 139-F, 140-F, 155-F, 162-F
lubrication in, 211-F
plastic deformation in, 279-F, 929-Q
in production of gears, 199-F
temperature measurement during, 23-F, 155-F
theory of, 281-F
Wire industry,
directory of British, 23-A
Wire ropes, 38-R
Workability. See Plastic deformation; Plastic properties
Working, cold, 154-Q, 527-Q, 635-Q, 720-Q, 892-Q
Working, metal. See Metalworking
World Metallurgical Congress, 11-A
Worthite. See Steels, alloy, chromium-copper-molybdenum-nickel-silicon
Wrought iron, 527-L, 921-L, 585-Q, 513-R, 72-V

Xeroradiography. See Nondestructive testing, radiographic; Radiography, xero-
X-ray diffraction. See Diffraction, X-ray
X-ray equipment, 69-M, 94-M, 269-M
X-ray methods. See also Diffraction, X-ray
X-ray methods, 105-S
X-ray microscopy. See Microscopy, X-ray

Yield strength. See also Strength properties
Yield strength, 501-Q
Young's modulus. See Elasticity modulus
Yugoslavia,
aluminum industry of, 146-A
nonferrous metals export from, 254-A

Zinc,
in aluminum casting alloys, 426-Q
aluminum plating on, 631-L
anelasticity of, 895-Q
applications of, 53-A, 157-A, 8-H, 252-R, 225-T, 4-V
from barite ores, 256-B
in brasses, 350-A
casting of, 167-C, 9-H
cathodic sputtering of, 47-L
contact melting with tin, 101-N
conservation in galvanizing, 6-L
core losses in, 394-P
corrosion of, 166-P, 316-P, 19-R, 173-R, 227-R, 231-R, 246-R, 311-R, 388-R, 450-R
corrosion inhibitors for, 350-R, 508-R
creep of, 1052-Q
crystal growth of, 47-N
deformation of bicrystals, 537-Q
determination of, 19-S, 48-S, 363-S
determination of iron in, 112-S
determination of oxygen in, 168-S
diffusion in α-brass, 307-N
diffusion in copper, 120-N
distillation of, 127-C, 19-N
drawing of, 500-G
ductility of, 614-Q
economic trends, 38-A, 95-A, 102-A, 115-A, 226-A
electrode potentials of, 316-P
electrodeposition of, 380-L, 398-L
electrolytic refining of, 157-C
electrometallurgy of, 17-B, 99-B, 143-C
etching of lithographic plates, 274-T
evaporated deposits, 448-M
expansion, thermal, 83-P
fatigue, thermal — of bicrystal, 537-Q
film formation on, 348-R
frictional properties of, 572-Q

Zinc (cont.)
for galvanizing, 516-L, 607-L
government regulations on, 123-A, 157-A
heat transfer at melting point, 507-P
high-purity, 299-N, 503-R
indium determination, polarographic, 444-S
magnetic properties of, 150-P
melting furnaces, induction, 597-E
metallurgy, extractive, 101-C
microscopy,
polarized-light, 391-M
optical, 160-N
molten,
evaporation, low-pressure, 19-N, 195-N, 421-P, 560-P, 261-R
nucleation of, 571-E
oxidation of, 245-R, 266-R
phosphating of, 539-L
pickling baths for, 972-L
pitting, aqueous, 19-R
plastic deformation of, 286-Q, 537-Q, 701-Q
polarographic study of, 506-R
production and supply of, 27-A, 134-A, 155-A, 186-A, 203-A, 215-A, 217-A, 4-V
reaction with liquids, 231-R
recovery from galvanizing process, 743-L
recovery from gold ores, 56-B
recovery from pickling solutions, 278-A
recovery from silver refining waste liquor, 334-A
recrystallization of, 160-N
reduction of, 62-C
shear strength of, 645-Q
smelting of — arc-furnace, 143-C
solidification shrinkage of, 377-E
solubilizing of, 1-P, 61-R, 171-R, 352-R
sprayed on iron and steels, 205-L
structures, deformation, 43-Q
susceptibility, magnetic, 14-P
thermodynamic properties of, 80-P, 217-P
twinning of, 476-M, 896-Q
vapor pressure over Ag-Zn alloys, 10-P
viscosity during electrochemical polarization, 195-P
wear resistance of, 973-Q
Zinc and alloys, 83-L, 852-L, 859-Q, 938-Q, 402-R
Zinc alloys,
aluminum, 425-E, 79-M, 928-Q, 930-Q
aluminum-chromium, 189-M, 257-M, 930-Q
aluminum-copper-lead, 446-R
aluminum determination in, 384-S
aluminum-magnesium, 301-M, 443-S
cadmium, 114-C, 377-E
cadmium-lead-tin, 153-M
Zinc alloys (cont.)
casting of, 148-E, 633-R, 943-Q, 992-Q
for castings, permanent-mold, 930-Q
cobalt-copper, 287-M
copper, 368-L, 431-M, 256-N, 293-N, 529-Q, 64-R, 170-R
copper-germanium, 159-M
copper-iron, 287-M
copper-magnesium, 297-M
copper-manganese, 287-M
copper-nickel, 287-M
creep of Cu-modified, 443-Q
for dies, 210-G, 339-G, 377-G, 39-T
die caster for, 417-E
die casting of, 43-E, 158-E, 399-E
for die castings, 930-Q
electroplating of, 155-L
extrusion of, 943-Q, 992-Q
fluidity of, 107-E
forging of, 943-Q, 992-Q
in forming dies, 278-E
foundry practice, 123-E
gold, 500-R
honing, 204-L
impact strength at low temperatures, 585-Q
iron, 127-H
lead-silver, 205-M
machining of, 943-Q, 992-Q
magnesium, 377-E, 46-M
magnesium-silver, 297-N
mechanical properties of, 755-Q
metallizing of forming dies, 75-L
molten, 930-Q
nickel, 466-M
palladium, 99-M
platinum, 152-M, 500-R
sodium 435-M
solidification of Kirksite dies, 278-E
stability, dimensional, 755-Q
tin, 425-E
in toolsteels, 377-T
workability of, 943-Q, 992-Q
Zinc-alloy sheets, 273-R, 318-R, 327-R, 329-R, 438-R
Zinc castings, 571-E
Zinc coatings. See also Galvanizing
Zinc coatings, 842-L
hot-dip, 641-L, 760-L, 761-L
mechanism of formation of, 237-L
production and applications of thin, 764-L
sprayed, 43-L, 154-L, 244-L, 603-L
for steels, 90-L, 560-L, 805-L, 490-R
tin, 1-R
for truck-trailer parts, 567-L
Zinc-copper couples, 240-N
Zinc die castings, 463-E, 464-E
applications of, 55-E, 287-E, 8-T, 229-T, 278-T, 280-T, 306-T, 324-T

Zinc die castings (cont.)
chromium plating of, 677-L
coatings for, 101-L, 342-L, 684-L
compressibility of, 1036-Q
copper plating on, 925-L
corrosion of, 384-R
dies for, 514-E
electrodeposition on, 342-L
enameling of, 25-L
finishing of, 264-L, 868-L
impregnation of, 206-E
optimum shapes for, 446-E
polishing of, 937-L
surface preparation for plating, 611-L, 682-L
production of, 503-E
tumbling, 989-L
welding of, 798-K
Zinc dust, 540-L, 627-L
Zinc electrodes, 537-R
Zinc electrodeposits, 101-L, 153-L, 424-L, 530-L, 852-L, 321-S
tin, 861-L
Zinc foil, 335-R
Zinc industry, 53-A
Zinc ores,
cadmium recovery from, 93-C
concentration of, 13-B, 17-B, 233-B
copper-gold-lead-silver, 58-B
copper-lead, 314-B
copper recovery from, 93-C
crushing and grinding of, 13-B, 233-B
flotation of, 13-B, 17-B, 218-B, 233-B, 323-B
germanium recovery from, 72-C
gold recovery from, 93-C
heavy-media separation of, 18-B
iron-lead, 172-B
leaching of, 17-B, 157-C
lead,
concentration of, 232-B, 287-B, 329-B, 369-B
crushing and grinding of, 329-B
flotation of, 267-B
flotation of — tracer studies, 178-B
silver recovery from, 329-B
lead recovery from, 93-C
lead removal from, 218-B
pig iron recovery from, 93-C
reduction of, 21-C, 154-C
resources of,
Africa, 353-A
Canada, 352-A
Sardinia, 201-B
U. S., 344-A, 345-A, 346-A, 347-A, 348-A, 349-A
world, 351-A
roasting of, 111-C
Zinc ores (cont.)
separation of cadmium, germanium, and lead concentrates from, 158-C
silver recovery from, 93-C
smelting of, 17-B, 93-C, 117-C
Zinc plates, 111-L
Zinc plating. See also Galvanizing
Zinc plating,
in acid baths, 152-L
on aluminum and alloys, 28-L, 414-L, 479-L, 707-L
bright, 94-L, 238-L, 869-L, 927-L, 928-L, 932-L
cell for, 957-L
on iron single crystals, 626-L
of small parts, 784-L
solutions for, 106-L, 445-L, 468-L, 599-L
tin, 133-L, 823-L, 861-L
on uranium, 982-L
Zinc powders, 106-H, 514-T
silver, 10-P
Zinc powder products,
copper, 51-H
Zinc sheets, 477-T
Zinc single crystals,
copper-plated, 413-Q
creep of, 311-Q, 797-Q
growth of, 247-N, 250-N, 284-N
kinking in, 988-Q
magnetic properties of, 163-P
mechanical properties of, 646-Q
oxide-film formation on, 5-R
plastic deformation of, 419-M, 896-Q
slip in, 43-Q, 1070-Q
twinning in, 254-P, 249-Q, 413-Q, 1070-Q
yield point of, 1075-Q, 1076-Q
Zinc systems,
carbon dioxide — water, 316-P
silver, 141-M
water, 316-P
Zinc tubing, 183-F
Zirconia, 120-C
Zirconium,
for aluminum-alloy grain refinement, 35-E
applications of, 90-T, 134-T, 571-T, 20-V, 23-V, 190-V, 197-V, 207-V
casting of, 192-E
chlorination of, 110-C
cleaning and finishing of, 23-V
corrosion of, 423-R
corrosion resistance of, 34-R, 76-R, 371-R, 207-V
degasification of, 137-N
deoxidation of, 137-N
determination of, 189-S, 485-S, 499-S
determination of hydrogen in, 197-S

Zirconium (cont.)
determination of nitrogen in, 197-S, 383-S
determination of oxygen in, 197-S
elasticity modulus of, 879-Q
fabrication of, 571-T, 163-V
forging of, 67-F
formability of, 23-V
foundry practice, 571-T
hafnium separation from, 278-A, 5-C
hardness of, 207-V
hazards of handling, 90-T
high-purity, 116-Q, 885-Q
machinability of, 23-V, 207-V
mechanical properties of, 23-V, 207-V
melting of, 58-C, 73-C, 192-E
metallurgy of, 301-A, 101-C, 163-V
microscopy, polarized-light, 391-M
nitrogen equilibria with, 137-N
oxygen equilibria with, 137-N
Poisson's ratio of, 879-Q
powder metallurgy of, 571-T
production of, 73-C, 110-C
properties of, 163-V, 201-V
recovery from beach sands, 244-B
refining of, 80-C, 20-V
rolling of, 67-F
scaling of, 321-R
separation from thorium and titanium, 48-C
shear modulus of, 879-Q
specific heat at very low temperatures, 501-P
in steels — as manganese substitutes, 229-D, 271-Q
strength properties of, 1054-Q
Zirconium (cont.)
structure, crystal, 239-M, 341-M
technology of, 203-V
transformations of, 341-M
vacuum refining of, 46-C
weldability of, 23-V, 207-V
welding of, 784-K, 571-T
working of, 135-F
Zirconium and alloys, 922-Q
Zirconium alloys, 497-K, 114-R, 207-V
chromium, 115-M
magnesium, 183-B, 180-M
oxygen, 885-Q
silicon, 387-M
tin, 385-M
titanium, 41-M, 175-N
Zirconium borides, 238-M, 279-M
Zirconium carbides, 120-C, 123-H
Zirconium carbide alloys, columbium, 114-H
Zirconium carbide powders, columbium, 114-H
Zirconium coatings, 764-L
Zirconium-hafnium system, 124-N
Zirconium hydride, 26-H, 68-H
Zirconium iodide, 414-P
Zirconium nitrides, 303-B, 254-T
Zirconium ores, 341-B, 20-V, 201-V
hafnium, 47-B
titanium, 186-B
Zirconium plating, 542-L
Zirconium powders, 26-H, 68-H
Zirconium powder compacts, 68-H
Zirconium steels. See Steels, alloy, zirconium